DESCRIPTIVE LIST

OF

TREES, SHRUBS

AND

ECONOMIC HERBS

OF THE

SOUTHERN CIRCLE
CENTRAL PROVINCES

BY

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Conservator of Forests

ALLAHABAD
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[PRICE—THREE RUPEES.]

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ADDENDUM.

Cadaba indica, *Lamk.* A straggling shrub belonging to the family *Capparidaceæ* with ovate or oblong leaves 1—1·5″ long and greenish-white flowers, has been reported by Mr. Smales as common about Chanda.

Anogeissus sericea, *Brandis.* It is doubtful whether this is distinct from A. acuminata. Specimens, closely resembling this species, of an oblong-leaved form only slightly sericeous between the sec. n. and with the tertiary n. less regularly scalariform than in typical A. acuminata have been forwarded by Mr. Smales from Moharli range, Chanda.

Mr. Smales points out that the glands in the leaves of Anogeissus are usually perfectly distinct although the leaves are included in the eglandular section in the key.

R.S. [illegible] to the [illegible]

[illegible]

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Ch. Con[illegible]

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PREFACE.

The list was first printed in the *Indian Forester* commencing with the October number of 1912, but the earlier families were very incomplete and the whole has been revised "to bring it into line, so far as circumstances permitted, with the general scheme approved by the Board of Forestry in 1913 (see Forest Bulletin No. 23, pages 2—3)."

Until 1906, C. P. Forest Officers had no list of their important trees and shrubs except in the form of some appendices to Working Plans. Some of these were very incomplete or even inaccurate, others, like that prepared by Mr. Clutterbuck for Alapalli, exceedingly useful for the limited area with which they dealt.

In 1906 Mr Hole, now Botanist at the Forest Research Institute, Dehra Dun, brought out a most useful list of the Trees, Shrubs and Climbers found in the Northern Forest Circle of the Central Provinces. This was followed up in 1908 by Mr. Witt's list of Trees, Shrubs and Climbers and other plants of economic importance found in the Berar Forest Circle which has been found of great use not only in Berar but in parts of the Southern Circle. Mr. Hole did not pretend that his list was complete and only referred to it as a preliminary list. I am greatly indebted for most of the Telugu names and other help to Mr. J Donald who drew up a very complete and accurate list of Trees and Shrubs for his South Chanda Working Plan. My thanks are due to Mr. Hole, Imperial Forest Botanist, for many valuable suggestions and especially for his kindness in seeing the printing of the 'Key' through the Press on its first appearance in the *Indian Forester*.

To Messrs. Beechey and Cole of the Forest Service are due the credit of enabling the identification of several forest products previously only known under vernacular names and sold under Leases of Minor Forest Produce. My departure from the Central Provinces before some of the roots forwarded by them had flowered still, however, leaves some work to be done in this direction.

RANCHI :
The 29th August 1915.

INTRODUCTION.

Area and Topography. The area included is the whole of the Southern Central Provinces excluding Berar and totals some 38,000 square miles, but the hilly Native State of Bastar probably possesses a number of species not yet entered in the list as the State is still imperfectly known botanically. The British districts are Wardha, Nagpur, Bhandara, Balaghat, Chanda, Bilaspur, Drug and Raipur, totalling 18,748 square miles including zemindaris. The Feudatory States are Bastar, Kanker, Nawagarh, Khairagarh, Nandgaon, Kawarda, Pendra, Sarengarh, Sakti, Kondka about 19,000 square miles. The group of hilly zemindaris in the extreme north-east bordering on the Chota Nagpur States have not been examined and are some of the most wild and interesting country in the provinces. They are not likely however to possess many trees or shrubs not included in the Lormi forests of Bilaspur or in the Chota Nagpur Forest Flora.

Topographically the area consists of a northern backbone of hills running from the north-eastern group of zemindaris above alluded to (Pendra, Matin, Uprora, etc.,) in a westerly and south-westerly direction right away into the Nagpur district. These hills belong to the Satpura system and attain their greatest height in the Maikal range (Amarkantak 3,493 ft.). They lie mostly south of the great Satpura 'tableland' and with the exception of the Baihar-Raigarh plateau in Balaght form rather its rugged sides than its top and often extend in long spurs and broken ranges penetrating far to the south.

To the south-west of this backbone in the Wardha and Western Nagpur districts the hills are flat-topped. In the south the tract becomes triangular in shape with the apex of the triangle penetrating between the State of Hyderabad from which it is separated by the Wardha, Pranhita and Godaveri rivers and the State of Jeypur in the Madras Presidency (part of this apex, the Cherla range, was a short while ago handed over to Madras). This southern triangle is again often hilly.

As a very long spur from the northen backbone runs southwards in the vicinity of the Lanji forest range of Balaghat district and nearly joins up with the hills of Bhandara and North Chanda from the southern mass, two large comparatively level plains, the Nagpur plain and the Chhatisgarh plain, are left on the west and east centre respectively; the Western (Nagpur) plain being mostly derived from the trap rocks and chiefly cotton soil, the Chhatisgarh plain being mainly derived from metamorphic and sandstone rocks. The former, also with a lower rainfall, is the country of the cotton and millets, the latter the rice country.

For identification of many of the rocks referred to in the following chapter I am indebted to Mr. H. H. Hayden, Director of the Geological Survey.

Duplicate specimens of these rocks have been placed in the museum of the Balaghat Forest School.

GEOLOGY AND SOIL.

1. The general arrangement of this account is from the west (Wardha and Nagpur districts, *i.e.*, Nagpur-Wardha Forest Division), south through Umrer range to the westerly ranges of North Chanda and South Chanda down to Sironcha in the extreme southerly extremity of the circle. A brief allusion to Bastar which lies east of Sironcha follows, then proceeding north again the easterly parts of South Chanda (Elchil, eastern Markhanda and Ghot ranges) and the eastern parts of North Chanda (Gunjewahi, Wairagarh and Brahmapuri ranges) into Bhandara.

The forest ranges of Bhandara are then dealt with from south to north. East of Bhandara lies Balaghat which is next dealt with. Then the Drug and Raipur districts (Raipur Forest Division), then Sonakhan in the Raipur district (but Bilaspur Forest Division), and finally the north and east of Bilaspur.

Nagpur-Wardha Division.

2. On the west of the circle the great Deccan trap occupies practically the whole of the Wardha district extending south nearly to the Chanda district and advancing into the Nagpur district up to Kelod and Nagpur (Sitabaldi and Seminary Hills) and down to Umrer and Nand sending outliers into the Chanda district (*e.g.*, Chicholi).

Roughly the Nagpur-Wardha Division is divided geologically by the Chindwara-Nagpur and Nagpur-Mul roads; the tract to the west of this line being trap, the tract to the east of crystalline metamorphic and sub-metamorphic rocks. The western region is characterised by flat-topped low hills, rounded boulders due to the hexagonal splitting and subsequent weathering of the trap hexagons, and cotton soil.

3 Along the dividing line there are some outcrops of the Kamthi sandstones and what are known as Lameta beds (a small group of limestones, sandstones and shales) and thin strata of similar fresh water deposits occur also as intertrappean beds. These sometimes contain interesting specimens of fossil wood as at Maragsur.

4. The Kamthi sandstones form an important outlier over a considerable area in the forests about Bazargaon, in the Nimji, Madhogarh, Sindhi and eastern portions of the Kolmunda and Chakdoh blocks. This formation while chiefly red sandstone giving rise to a very sandy soil also contains conglomerates, shales and quartz stones. Shales overlie the sandstone near Katlabori. A quartz conglomerate was found in the Madhogarh block.

5. Practically the whole of the Khondali, Arvi and Hingni and most of the Umrer forest ranges will be seen to lie on the trap area while the two Pench ranges (east and west) and the Rambori block of Umrer are on crystalline rocks. The small Girur block is on Lametas.

6. The black cotton soil which so constantly overlies the trap to various depths is frequently mixed with layers of concretionary lime (kankar) which when in excess seems very inimicable to forest growth, probably due to the excess of lime causing the whole to set like masonry in periods of drought.

Laterite occurs on the top of some of the hills, *e.g.*, in Hingni forest on the Jaitgarh ridge.

7. The hills of the trap region rarely exceed 1,500 ft. in height. It is the region of small teak poles but in some places, especially where water-logged, teak is replaced by Butea frondosa (Munia forest).

The boundary of the trap and sandstone may be seen at a nala south of Ghordeo Tekri. On the sandstone there is a very poorly stocked mixed forest of Satin wood, Khair, Terminalia, Saccopetalum, Zizyphus, Anogeissus, few teak, Boswellia and Lagerstrœmia or sometimes merely Phœnix and clumps of thorns. This very poor condition is however connected with overgrazing.

8. To the east of the Trap and Lameta line follows a very large area of crystalline rocks extending practically along the whole northern backbone of hills away to Bilaspur.

In the north of the Nagpur district the two Pench ranges rise into picturesque forest clad hills chiefly of Dharwars (Chilpi ghat rocks) rarely overlaid near the Chindwara boundary by small trap inliers.

The predominating rocks in these hills are mica schists and quartzites producing sandy loams or loam with quartz stones. Underlying them is gneiss (archean or metamorphic formation). Manganiferous rocks of the Dharwars are worked n many places.

Although teak is not so gregarious as in the western area it attains much larger size in the alluvium of the valleys of this area, and small teak are frequently seen crowning the summits of hills.

Natural reproduction of the teak occurs abundantly on the gneiss near Paoni and Deolapur, on mica schist at Belda, and along sandy nalas in the Sailari-khapa forests. Good teak is found on mica schist at Khanora (near Belda).

Quartzite is the principal rock at Karwahi. At Sailari is the soil termed 'Gohari,' a second class cotton soil, and 'Serar' a very hard sandy loam due to decomposition of a very quartzitic gneiss. Granite or gneiss is often exposed in the deeper valleys. Cotton soil itself often occurs on the gneiss at the foot of the hills.

South of the Pench Hills and east of the trap the greater part of the larger Nagpur plain is gneiss covered more or less by alluvium and sometimes cotton soil. This gneiss spreads east into the Bhandara plain.

North Chanda, Western Ranges.

9. Coming south to the Chanda boundary we find the trap barely entering in places. The line between the trap and quartz and gravel beds (Lameta beds) runs close to Salebhatti village and a section of the Kulhar nala near Ukarpar shows shale (Talchirs ?). At Birsee again is deep gravel and quartz. Further to the east the Nagpur gneiss extends far south into the Brahmapuri and Wairagarh ranges (see paras. 12 and 17) and also on the west of the Warora range where it is overlaid by cotton soil (Ainsa forest, etc.).

About Warora itself and extending right down through Chanda and Dhaba are Gondwana rocks, principally the Kamthi group of sandstones but with the younger Barakar group containing important coal beds underlying the alluvium about Warora.

None of these Barakar beds are, as far as I know, found in our forests but exposed to the east of the Warora range (south of Chimur) and comprising practically the whole of the Moharli range is a low plateau with steep escarpments consisting almost wholly of another older sandstone formation, the Vindhyans.

The Vindhyan sandstone (or rather quartzite) is a very hard glistening white, pink or purple rock. Rarely in the Moharli forests I have met shales and slates in this formation and limestone beds are also said to occur. Laterite is rare in the Moharli and east Warora forests, but blocks of laterite occur in the Andhari river valley and other places, and sometimes cotton soil overlies the sandstone.

Trees common on the trap inliers and cotton soil are Khair (Acacia Catechu), Balanites, large Acacia leucophlœa, Rohan (Soymida), Dichrostachys and Terminalia tomentosa.

On the sandstones Dalbergia, paniculata Pterocarpus Marsupium, Anogeissus, large Chloroxylon and, especially characteristic of sandstone or quartzite plateau, Albizzia Thomsoni, Bridelia Hamiltoniana and Crotalaria ramosissima.

10. The Kamthi group has already been mentioned as occurring south of Warora. It also occurs south of the Moharli range, in the Haveli range, on a lower level than the Vindhyan plateau. Cotton soil often overlies this sandstone. From Pipalkhut to Chanda is cotton soil or clay or lime and *much laterite* overlying the sandstone. Towards Junona (Haveli range) a red and purple clay rock, *impure limonite*, is very common in the Kamthi group. Kankar is also common.

Shales, often hard and arenaceous, are common in the sandstone.

The soils are thus various, but laterite overlying sandstone is quite a useful soil and grows most excellent Garari (Cleistanthus collinus) and soil resulting from the combined decomposition of the shales and sandstones is also frequently well stocked.

South Chanda, Western Ranges.

11. Entering South Chanda Division the whole of the Dhaba range is again Kamthi sandstone (excepting the outlying blocks to east, *viz.*, Pombhurna and Dighori).

It is often interbedded with a hard ferruginous rock (limonite) and the nala beds are very full of lime which, as remarked above, produces a very barren soil. Conglomerates in a hard lime matrix also occur in the Kāmthi sandstones.

12. Owing to the bend in the Wardha river we now proceed east across the Wainganga into the western Markhanda forests. Towards Talodhi the gneiss is struck and it is found right across the Waingangа valley (in continuation of the south extending area already alluded to in para. 9). All these western Markhanda forests are on gneiss with overlying cotton soil and here again is an extensive area of small badly grown teak with much Iseilema, Khair, Pallas (Butea), Acacia leucophlœa, Zizyphus and Gymnosporia. The gneiss area, owing to the river having cut away more recent formations, continues on the lower ground all the way to Alapalli (Alapalli range) and Ahiri, but a little to the east we meet with hills, and the hills of Alapalli (range) and of Ahiri (Zemindari) appear to be Dharwars. These hills are of quartz and mica schists and clay schists. Clay rocks were found at Mirkal, a hard red clay or slate was obtained from the Tomta hill (overlooking Wamanpalli).

The mixture of quartz and mica sand and clay produce a loamy alluvium which, together with the heavier rainfall and the shelter of the hills, grows the finest teak in the Central Provinces, but where this covers the gneiss in the larger river valleys the land is mostly under cultivation. Large Ougeinia, Chloroxylon and other trees are also met with. South of the Bhimaram line fine Hardwickia binata (Anjan) are common.

13. South of the Alapalli range sandstone and quartzites of the lower Vindhyans again appear forming a mass of hills to the south-east of Devalmari (which is itself Dharwars?) and sandstones are the first rocks struck in the Sironcha hills about Bejurpalli.

Ahiri.

14. The Sironcha range consists of several series of rocks from quartzites and slates (Dharwars? or Upper Kadapah formation) at Korla, Sukria Weg, Kudel Weg valley, Sirkonda hills (1,736 ft.), Deslai and Bodalkasa to sandstones (both Vindhyans and Gondwanas) and conglomerates and clays (Gondwanas). In the south of the range, about Kopela and Samanpalli, there are outcrops of banded clays with a steep dip in the river cuttings. There are also clay schists right up to Patagudam dipping steeply to the north-east.

Sironcha.

At Karjali are sandstone boulders on the top of the clay. The top soil near Sirkonda is cotton but along the Pital Togu is shale.

These different series of rocks usually have a north-west and south-east strike. Hardwickia binata is common on most of the sandstones with teak, satin and the grass Aristida. Small Xylia and Diospyros are also common on quartzite and sandstone hills, while the Hardwickia is usually confined to the lower ground. In the sandstone are often iron pans near the surface and such areas are often covered with the dwarf Phœnix. Poor sandy nalas and flats have a botanical formation very distinct from most of the Central Provinces; its chief constituents being Euonymus Godaverensis, Memecylon, Mimusops, Erythroxylon monogynum, Dodonœa, Gardenia, Gelonium and other small trees or shrubs with simple entire often coriaceous leaves.

The grass Aristida, a pest from its trifid awns, occurs everywhere on overgrazed sandstone and also on clay but on cotton soil Eragrostis and Paspalum are common in heavily-grazed localities with Terminalia tomentosa and Stephegyne as the characteristic trees. The quartzite hills of Satagudam and the Sukria valley contain much spear grass and Andropogon monticola, a very variable grass which in some form occurs on almost all formations.

Bastar.

15. East of Chanda lies the large Feudatory State of Bastar of which the geology is practically unknown, but from descriptions of "large boulders of vitrified sandstone which glitter with a pinkish hue" and of "ranges of sandstone hills in the south," it is probable that both the Vindhyan and Gondwana sandstones are very largely represented in the south and centre, while the gneiss and Dharwar formations no doubt enter from the districts where they are largely represented to the north and north-west of Bastar. The centre and north-west are said to be very mountainous and on the east is a tableland nearly 2,000 ft. high. A range, Bela Diha, crosses the centre increasing in height southwards where it culminates in the peaks Nandiraj and Pitur Rani between 3,000 and 4,000 ft. high (Gazetteer). The country must contain many interesting species not found in the rest of the Central Provinces.

South Chanda, Eastern Ranges.

16. Having dealt with the whole western side and southern apex of the Chanda triangle it is necessary to take up the more easterly ranges, first of South and then of North Chanda. To the north of the Alapalli range are successively the Elchil reserves, eastern Markhanda and the Ghot ranges, and the eastern blocks Pombhurna and Dighori of the Dhaba range.

The basis of all this region in the plains is usually granite and gneiss and the hills are Dharwars; Chloritic gneiss and Pegmatite were found in the Pombhurna and Dighori forests. Between Elgur and Elchil the gneiss has red felspar, and hornblende schists of the Dharwars occur near Elchil while in crossing the Duia river in the Ghot range between Regri and Garanji the crossing is made over shale (probably Dharwars). The rocks in the valleys of the Ghot range are usually clay schists or shales and the hills hornblende schists and quartz schists. Quartz schists occur at Madoli in the extreme north of the Ghot range. Although as said above these hills seem mostly Dharwars there are evidences of a thrust through of igneous rocks and a fine grained dolerite (superficially resembling some of the manganese ores), an intensely hard black rock was found at the top of Mukri Hill and large sheets of it in the Machligutta forest.

The argillaceous rocks so common in the forests usually abound with Dillenia aurea, Gardenia gummifera, and Ochna Gamblei.

North Chanda, Eastern Ranges.

17. Proceeding north into the Wairagarh range (east of Wainganga) and Gunjewahi range (west of Wainganga) of North Chanda the comparatively high hills with deep valleys disappear.

The rocks above the basal gneiss up through Wehar and Gunjewahi are mainly quartz schists producing a sandy or stony unfertile soil with poor growth and often much Calycopteris. Further to the west towards the railway line the soil is better and gneiss and cotton soil sometimes occur. In the Chikmara and Maregaon forests of Gunjewahi the soil is often a deep red loam with quartz fragments. It is made up to a great extent from lateritic decomposition and is an excellent forest soil especially for Garari (Cleistanthus collinus). In the Garmausi forest, again, there is often a white sandy loam derived from the decomposition of gneiss and quartz schists which is poor but on the small plateau is laterite. Here is much Ischæmum laxum, an excellent fodder grass. The laterite extends up to Aikala and Brahmapuri where a nice dense growth of Cleistanthus, Phyllanthus Emblica, Buchanania, Terminalia, Chloroxylon, etc., occurs, but frequently in the Brahmapuri range gneiss with pink felspar and hornblende schists are exposed and the stock from the combined effects of soil and ill-treatment is reduced to thorns especially Zizyphus Œnoplia. The Ochli block has sandy soil. In the west of Brahmapuri range are hills (*e.g.*, Sathbaini hill) of quartzite and quartz mica schists (these may be Vindhyan ?).

The Wairagarh range has similar transitions from gneiss to quartz schist, more rarely hornblende schist (Delora Khurd and Wairagarh), clay iron schists (Murjha and Koswi), and often upper layers of laterite. A large quantity of Grewia orbiculata and Acacia Donaldi occurs on the more or less hard sandy soils of these blocks.

Bhandara, Southern Range.

18. Proceeding north the Pauni and Partabgarh ranges of Bhandara are entered. The western of these (Pauni) reproduces the geology of the Wairagarh range. A light coloured loam (Sihari) derived from clay and mica schists with some laterite produces a good crop in the Pipalgaon Working Circle. The Partabgarh range is almost wholly on Dharwars and the prevailing rock of the hills is quartzite with Andropogon monticola as the characteristic grass. A conspicuous pudding-stone rock in the Gotangaon forest is a quartz-felspar porphyry. East of Gotangaon are argillaceous rocks with quartz veins, such rocks being usually common in the Dharwars and when found bedded with quartzites (yielding sand) grow good forests, but much of the country to the east of Partabgarh is granite.

The backbone of quartzite extends north to the large Nowagaon lake but the Nishani hills to the north-east of this lake is chief diabase, an igneous rock.

Gaikhuri Range.

19. Proceeding to the Gaikhuri range the Dharwars are again found. Although this formation does not bulk so largely on geological maps it is the most important from our point of view owing to its being the chief hill-forming formation of the circle and thus occurring very largely in forest tracts. In the Gaikhuri range clay schists and phyllites are more in evidence than quartzites, usually inclined at a very high angle. The Kodurli Hurki, a large hill, is almost all phyllite capped by quartz rocks.

Towards Bhandara the metamorphic rocks and gneiss are again found

Bawanthari Range.

20. There remains the Bawanthari range of Bhandara. This lies east of the Pench hills and is of the same formation, *viz.*, metamorphic rocks such as mica schists and quartz schists and sub-metamorphic rocks (Dharwars ?) such as quartzites. The Chandpur fort is built of quartzite rocks

on a hill of the same. At Chicholi are mica schists and quartz schists and managnese mines ; at Lendijhiri, a shelly gneiss; at Magurli mica schists and quartz while in the Sukri block is much pegmatite composed of large crystals of pink felspar and mica. Flat localities are usually sandy or are bound together with lime and are then very barren. Some of the hills have fine Boswellia and Cochlospermum.

Before leaving Bhandara it should be noted that fine Zemindari forests occur on the high land to the east of the district chiefly on clay schists.

Balaghat, Sonawani Range

21. In Balaghat is again found an eastern extension of the metamorphic (archean) and Dharwar formations.

Paraswaraghat on the boundary of Bawanthari and Sonawani ranges is quartz mica schists. To obviate confusion it should be mentioned that the old term 'metamorphic' is used by me to refer to the various gneisses and schists which are all referred to in the Gazetteers as 'gneisses.' The old term sub-metamorphic or transition series corresponds roughly to the 'Dharwars' or 'Chilpi ghat' series. As these are often of very similar lithological character they are not always easy to discriminate.

The Sonawani range is chiefly mica schist and quartz. The 'Bawar' soil at the foot of the hills is a light coloured loam full of lime and covered by quartz pebbles, due to decomposition of the same rocks. The new road to Chiklabori is cut mainly through clay and quartz schists. At Ramrama are large manganese mines associated with clay and quartz schists and quartzites, almost certainly of the Dharwars (though no Dharwars are shown on the geological maps of this part).

Proceeding east from Sonawani range gneiss is met at Bahitekri, and at Chachari it is covered with deep alluvium, growing good teak.

Paraswara and Dhansua.

22. The Paraswara forests are very interesting, the hills on the Dhimrutola-Sawajhari line consist of large granitic rocks and pegmatite (not geologically surveyed) and near Kota in the extreme north are large deposits of a crystalline limestone resembling Calcite which is burnt for lime. Towards Barkho, the low hills have a white soil derived from

the decomposition of the granite, containing much soda-lime and very unproductive.

The centre and north of Dhansua range is mainly mica schist and other metamorphic rocks but roughly south of the Dhansua-Laughar road are all rocks of the Dharwars chiefly clays and phyllites and there is much Sindhi (Phœnix acaulis).

Near Kukra some of the hills are capped with laterite and there are outcrops of quartz schist producing a poor light coloured soil with much Dillenia aurea. In the Nahera valley, in the deep gorge of the Bhimsen Ghogra, the fundamental gneiss is exposed. Eastwards in the Sarekha the hills are mostly mica schists, hornblende schists and quartz and there is much Ischœmum angustifolium (Sum or Sabai grass).

Baihar and Raigarh.

23. Between Samnarpur and Baihar (Jalta forest) the hills are of gneiss with clay schists on the flanks and right away across the Baihar and Raighar plateau (Khapa, Sondhar, Muki, Sukri, and Supkhar) the sub-rock appears to be gneiss but good exposures are difficult to obtain. This is Sal country. Trap here enters from the great Mandla plateau in several places.

The southern extension of the hills in Bhanpur Zemindari and the long south-trending range of the Lanji hills, penetrating into Khairagarh, are Dharwars, micaceous quartzites and clay schists; the grass Imperata arundinacea (Chir) being common on the clays.

Raipur Division.

24. Entering the Drug district it is found that all the western blocks of the Balod range consist of bedded quartzites, slates and clay rocks of the Dharwars extending east to Lohara and Sanjari. The Dharwars from Khairagarh and Balaghat also occupy the north-west hilly projection of the Drug district, but the great mass of the Drug-Raipur district which is flat are coloured shales and limestones of the Kadapah series, often covered with laterite, the so-called 'Bhata' lands.

The main area of the Balod range forms a low plateau consisting of a very hard sandstone, Chandpur sandstone, also said to belong to the Kadapah series. It is occasionally scooped out into deep valleys in which gneiss is exposed. The blocks to the south of the Balod and Dhamtari ranges are of gneiss or metamorphic rock. The plateau of hard sandstone is usually well stocked at the edges (ghats) but is often poorly stocked on the top. The surface of the sandstone is greatly improved in places, by laterite or clays, remains of the denuded shale beds, or cotton soil (*e.g.*, in Kashibahara, Ruputola, Pitechuwa, Barbhum, etc.). The plateau extends right through the Dhamtari range and curves round to the north away from the Sihawa forests through the Singpur and Sirpur-Khalari range and into Sonakhan range of Bilaspur Division.

South of Dokal is loam or laterite resting apparently on metamorphic rocks and as in Balod, the valleys often cut through the sandstone on to older rocks and are better, or even well, stocked. Towards the south-east of Dhamtari range and south of Singpur range the sandstone disappears. I only extends for a short distance and at interwals into North Sihawa; its eastern boundary on the Pairi and Sonda river valleys being characterised by fine vertical scarps, with excellent forest at their foot. On the north, in the Singpur range, it descends gradually and on the south, south of Singhpur, it thins out on to the gneiss (near Kuripathar). The Nagri-Mohdi road is thus enabled to pass right over the plateau from north to south.

25. All over South Sihawa and part of North Sihawa the topography and geology differ from the above. In place of sandstone plateaux there are fine hills and valleys and in place of the sandstones and limestones are granites and schists. There is granite in the hills north of Sihoa, also along the Jeypore boundary, a coarse grained granite in the Boiragaon forest near the Sondal Nadi, and arkose in the hills east of Belarbehra South Sihawa), etc. Between the granite hills the soil is frequently a deep loam and grows good Sal forest. Many of these rocks however give by decomposition a mixture of clay and lime on which Sal grows badly, if at all. A very poor sandy soil with quartz fragments is also derived from some of the schists (*e.g.*, Belarbehra and Nagri.)

26. West of Mohera (North Sihawa) in the Ghumar nala a section may be seen from the clay slates of the metamorphic to the sandstone of the Kadapahs. Here is a large deposit of Kaolin under the sandstone. In the Singpur-Khalari range, the Chandpur sandstone is flanked towards the west (*i.e.*, towards the Mahanadi valley) by limestones and shales under which it dips but the whole of the eastern blocks of the range are occupied by metamorphic and intrusive rocks and large areas of cotton soil growing dense crops of Anthistiria laxa and heavily grazed. In this range again the sandstone

forms large plateaux with escarpments, often double escarpments, on the east and dipping to the west with very gentle dip so that the approach on the western side is often imperceptible. Thus from Mahasamand to Chorbatti the soil is clay and laterite (here distinguished by a wonderful growth of Gardenia lucida), an outcrop of violet sandstone occurs at Chorbatti; about Lohardih and Malidih (north of the Kurar river) the plateau becomes better marked, often with exposed rock and Euphorbia, and thence the sandstone is continuous west of Raitum and east of Sirpur right up to Asnid in the north of Laon range where it joins the Sonakhan range. Grit and conglomerates sometimes occur with the sandstone. About Sirpur and Persada is a large quantity of the blue limestone which outcrops at various places along the Mahanadi valley. At Sitakhund are rocks of a hard banded coloured sandstone. Reverting again to the eastern parts of the Sirpur and Laon ranges all the blocks east of Phingeswar (which is on sandstone) are composed of granites and arkose rising into considerable hills (*e.g.*, Kanai Behra) near the Suarmar boundary but often covered with cotton soil in the valleys. The arkose decomposes mostly into a gravel. The Chirko block (south of Raitum) is cotton soil with a small granite hill in the south.

27. In the plains about Mohdi and Nawapara are large areas of cotton soil, and hills east of this line are only occasional until close to the Sonakhan boundary at Kolari where is gneiss and slate. The crop relations with the rocks are often very clear in Raipur. On the hard sandstone is low mixed forest with Satin, Boswellia and Acacia Donaldi. Terminalia tomentosa is small. The stock is often very thin and sometimes on the upper plateau reduced to Acacia Catechu and Donaldi, Euphorbia and Bridelia Hamiltoniana. With heavy grazing the grasses are reduced to a short growth of three or four species of Eragrostis (Barbhusi), the chief one (ciliata) being slightly scented and not eaten by cattle but burning like tinder when dry. When closed to grazing the sandstone grows spear grass and Andropogon monticola and on broken ground Cymbopogon Martini is common. When covered with other soils or in débris at the foot of escarpments the stock is often dense and frequently contains teak. On laterite soils Cleistanthus collinus is common and well grown. Mixed forest of cotton soil is characterised by much Terminalia tomentosa. The best fodder grasses (Iseilema spp., etc.,) grow on cotton soil but they are often supplanted on the gneiss when there is much lime in the soil by 'Bhond' (Anthistiria laxa and ciliata). On such soils also Soymida

and Dodonæa are characteristic. The Sal forests occupy two principal regions, one in Sihoa, the other in Laon. Both these are on the metamorphic rocks. There are occasional patches of fine teak but these are generally on alluvium. The deeper damper valleys in Sihawa are occupied mainly by fine Terminalias with Adina and Anogeissus and some by bamboo.

Bilaspur Division.

28. The Sonakhan range of Bilaspur Division (Raipur district) has already been alluded to above in connection with the extension of the Kadapah sandstones in the direction of Asnid. These run to Pondi, Maharaji and away east to Gindola forming again more or less of a plateau or ridge growing a poor forest of Acacia, Albizzia amara, Waltheria and grass.

To the north of this belt is a continuation of the Chhatisgarh plain with its blue limestone and shale right up to the Mahanadi.

South of it lies the bulk of the Sonakhan range on metamorphic and sub-metamorphic rocks. From Kusamsara to Tenduchua the soil has numerous quartz fragments and probably rests on the quartz felspar gneiss which is common in the south with dykes of basalt. In this district again we find the Sal forests of Sonakhan on the metamorphic and Dharwar system. They cease abruptly at the sandstone belt and are absent from the limestone. Much of the Sal area rests on clay schists which are inclined at a very high angle. Teak occurs chiefly on alluvial beds and at the foot of the hills. On the Baithali Dongri—a hard slatey looking rock -chlorite schist—is found growing chiefly bamboo and mixed forests.

North of the Mahanadi is again an extension of the Chhatisgarh plain and with similar characteristics. The Chandpur sandstones again occur in a discontinuous raised ridge commencing some ten miles to east of Bilaspur. At Kota further north are also hard sandstones, but these belong to the Dharwar system to which the whole of the Lormi hills belong extending right up to the Mandla boundary and Amarkantak.

29 From Sheotarai (Lormi range) to Sarhaiya and Achankmar the rocks of this system are mainly clay schists like those recurring in the south Sonakhan forest and here again the Sal appears. In ascending the ghat the Sal is often replaced for a time by mixed forest on the schist and gneisses except on the gentler gradients but it occurs again.

above the ghats. The rocks are usually pitched at a very high angle, a favourable factor for the growth of Sal. About Chhapawa there are hornblende and mica schists. Below and on the high ridge forming the northern Lormi boundary are massive laterite rocks and below the laterite are again hornblende schists (as at Bedarpani). Hornblende and mica schists are also much in evidence on the Boerha-Deosara road line, but clay schists are probably the commonest rocks in the Lormi forests. Extending east is the Pantora range. Most of the forests of this range are again on a belt of crystalline archean rocks; the Barakars and Kadapahs to the north and south, respectively, being under cultivation. The new road from Khesidih to Delwahdih (Sonthi Hill) passes through gneisses and schists. In these rocks of the Pantora range there is again Sal, but none was observed on the Kadapah formation.

SYNOPSIS OF FAMILIES.

(The characters are drawn up mainly with reference to the plants in the list.)

Class I.—Dicotyledons (Cp. p. xxvi.)

This class includes all the common trees and shrubs with the exception of Palms and Bamboos. It also includes most of the herbs with the exception of the grasses and the majority of those with annual leafy shoots from a tuberous root (such as the gingers, lilies and yams). The stem consists of concentric layers. On the outside is *bark* and inner living bark (phlœum), which are separated from the *wood* cylinder by a very thin ring of growing cells (*cambium*). The centre of the stem is occupied at least when young, by *pith*. The leaves usually have much branched nervation. The embryo has two cotyledons.

Series I.—Polypetalæ. (Cp. pp. xxiii, xxv.)

Fls with both calyx and corolla which are dissimilar. Corolla of distinct petals. Calyx of distinct or connate sepals.

Exceptions.—Corolla O in a few Bixaceæ, Sterculiaceæ, and Rhamnaceæ, some Sapindaceæ, Cæsalpiniaceæ, Combretaceæ, and Samydaceæ.

In Clematis (Ranunculaceæ) the corolla is O, but the sepals are petaloid. In some Ampelidaceæ the corolla is deciduous before expanding.

Calyx and corolla are nearly similar in some Menispermaceæ, Anonaceæ and Polygalaceæ, both petaloid in Moringa.

Calyx lobes or sepals absent in Olax.

Petals sometimes united at their base and to the staminal tube in Malvaceæ, Meliaceæ, Polygala, and Leea. Corolla practically gamopetalous in some Mimosaceæ, in which fls. are collected into heads.

A — Thalamifloræ and Discifloræ. (Cp p. xxi.)

Petals and stamens inserted on the receptacle or torus (thalamus) at a *lower level* than the ovary, or stamens inserted on an annular thickening of the receptacle (disc) surrounding the base of the ovary.

Exceptions.—Fls. somewhat perigynous* in some Capparidaceæ, Celastraceæ, Rhamnaceæ and Ampelidaceæ, epigynous* in Helinus (Rhamnaceæ .

See also exceptions under Calycifloræ, p. xxi.

1. Ranunculaceæ, p. 1. L. opposite. Sepals petaloid. Stamens ∞, anthers adnate, longitudinally dehiscent. Carpels numerous, *free*, 1-celled. Climbers.

2. Dilleniaceæ, p 1. L. large alternate, simple, penni-nerved petioles sheathing. Fl large or m s. white or yellow. Sepals 5, imbricate, persistent, petals 5, caducous. Carpels 5 or many, united in the axis with free styles.

3. Anonaceæ, p. 2. L. alternate, simple, exstipulate. Sepals 3, petals in one or two trimerous whorls. Stamens ∞, filaments short or none, anther-cells adnate to a broad connective. Carpels distinct in fruit (confluent in Anona). Seeds large, embryo small, endosperm ruminated.

4. Menispermaceæ, p. 4. Climbers. L. alternate, simple, palmi-nerved, often peltate, exstipulate. Fl. small, unisexual, *trimerous*, sepals usually free. Stamens 6 opposite to petals, or sessile on a column, carpels free, 1, or 3—6. Embryo curved, with or without endosperm.

Exceptions.—M. fl. 4-merous, fem. 2-merous, in Cissampelos.

5. Capparidaceæ, p. 5. L. alternate, simple or digitate, stipules often spinescent Fl. often zygomorphic. Sepals 4, petals 4. Stamens numerous, (exc. in some herbs), long. Carpels 1-celled with 2 - 4 parietal placentas, often on an elongated gynophore. Embryo curved, or spiral.

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* These terms are defined on page xxi

6. Bixaceæ, p. 7. L. alternate, simple, stipules small or O. Fl. regular, 1—2-sexual, 4- or 5-merous, stamens numerous. Ovary 1-celled or 2—8-celled with parietal placentæ. Embryo straight.

7. Polygalaceæ, p. 8. Herbs. L. alternate, simple, entire, exstipulate. Fl. bisexual, zygomorphic, sepals 5, the 2 inner larger, petaloid, corolla with 2 lateral petals rudimentary and anterior developed as a keel or lip. Stamens 8, monadelphous.

8. Tamaricaceæ, p. 8. Shrubs. L. very small, scale-like. Fl. regular, in spikes or racemes, sepals and petals 5, free, persistent. Stamens as many as petals or twice their number. Placentæ at base of ovary. Capsule 3—5-valved, seeds comose.

9. Dipterocarpaceæ, p. 9. Resinous trees. L. alternate, usually coriaceous, simple, penni-nerved, stipules caducous. Fl. regular, sepals 5 connate below. Petals 5, contorted, stamens indefinite, anthers adnate to filaments Fruit indehiscent, 1-seeded, enclosed in the calyx of which the sepals are enlarged as wings.

10. Malvaceæ, p. 9 L. alternate, stipulate, generally palmi-nerved, hairs usually stellate. Fl. regular, often with epicalyx. Sepals usually 5, valvate, more or less connate, petals as many, base adnate to staminal-column, contorted in bud. Stamens numerous, filaments variously connate, anthers 1-celled.

11. Sterculiaceæ, p. 19. L. alternate, generally palmi-nerved, mostly stipulate, hairs often stellate. Epicalyx sometimes present. Sepals usually 5, valvate, more or less connate, petals as many (O in Sterculia). Stamens monadelphous or united below, anthers 2-celled. Disc O. Fr. a capsule or a whorl of distinct carpels (only 1 in Waltheria).

12. Tiliaceæ, p. 22. L. alternate, simple, generally palmi-nerved, stipules deciduous Fl regular without epicalyx. Sepals 5, free, valvate in bud. Stamens numerous or definite, not united, anthers 2-celled. Disc O. Ovary 2—10-celled.

13. Linaceæ, p. 30. L. alternate, simple, entire, penni-nerved. Fl. regular, 4—5-merous. Stamens 5 perfect alternating with staminodes, connate at base, anthers versatile. Disc of glands. Ovary 3—5-celled. Capsule dehiscing septicidally.

14. Malpighiaceæ, p 31. Climbing shrubs. L. opposite, simple, entire, stipules small or O. Fl. often zygomorphic, calyx 5-lobed, petals 5, often fimbriate. Stamens 10, declinate or unequal. Ovary 3-lobed. Fr. usually of 1—3-winged samaras.

15. Zygophyllaceæ, p. 32. L. pinnate but with only one pair of leaflets Fls small yellowish. Sep. and pet. 5 imbricate. St. 10 at base of disc. Fruit an oily 1-celled drupe.

16. Rutaceæ, p. 32. L. aromatic, dotted with translucent glands, exstipulate. Fl. regular, sepals and petals 4 or 5, stamens twice as many or numerous inserted on the outside of the disc. Seeds never winged.

17. Simarubaceæ, p. 35. Bark bitter, L. alternate, pinnate, exstipulate. Fl. regular, small, polygamous, sepals 5—6, connate below, petals 3—6 Stamens 10 or only 2—3 inserted outside the disc. Fruit samaroid.

18. Ochnaceæ, p. 35. L alternate, simple, glabrous, stipulate. Fl regular. Sepals 4 or 5, free, imbricate, persistant, petals 5 or more, yellow, stamens ∞, anthers basifixed. Ovary deeply lobed. Fr. of 3—10 one-seeded drupels.

19. Burseraceæ, p. 36. Resinous trees. L. alternate, imparipinnate. Fl. small, regular, calyx 3—6-lobed, petals 3—6. Stamens twice as many as petals, inserted on the disc or outside at its base. Ovary 3—5-celled, ovules 2 in each cell.

20. Meliaceæ, p. 37. L. alternate, not gland-dotted (exc. Chloroxylon), pinnate (2—3-pinnate in Melia) exstipulate. Fl. regular, in cymose panicles, calyx small. 3—6-cleft, petals 3—6, stamens twice the number of petals, filaments united into a tube (exc. Cedrela and Chloroxylon), disc between stamens and ovary, often tubular. Seeds often winged.

21. Olacaceæ, p. 41. L. alternate, simple, exstipulate. Fl. small, calyx small or wanting, stamens opposite to petals or 2—3-times as many. Ovary 1-celled or at base 2—5-celled, ovules pendulous from a free axile placenta. Drupe 1-seeded.

22. Celastraceæ, p. 42 L. simple, opposite or alt., stipules minute or O. Fl. regular, small, 2-sexual or polygamous, calyx small, 4- or 5-lobed, persistent. Petals exceeding the sepals. Disc large, surrounding the base of the 3—5-celled ovary or partially enclosing it, stamens 3—5 on the disc.

23. Rhamnaceæ, p. 44. Branchlets or stipules often spinescent. L. simple. Fl. small, regular, calyx 4—5-cleft, lobes triangular, valvate in bud, disc lining or filling the calyx-tube, petals inserted at the mouth of calyx-tube smaller than the sepals. Stamens opposite to petals, often enclosed by them, more or less perigynous. Ovary cells 1-ovuled.

24. Ampelidaceæ. p. 48. Erect, or climbers with tendrils. L. alternate, often compound. Fl. regular, calyx small, entire

or 4—5-dentate, petals 4—5, valvate in bud. Stamens opposite to petals, inserted outside or between the lobes of the disc. Ovary cells 2-ovuled. Fr. a berry.

25. Sapindaceæ, p. 52. L. alternate (simple or pinnate), exstipulate. Fl. sometimes zygomorphic, mostly polygamous. Stamens inserted between disc and ovary, filaments usually hairy, disc oblique or unilateral. Ovary 3-celled, often 3-lobed.

26. Anacardiaceæ, p. 54. L. simple or pinnate, alternate, exstipulate. Fl. small polygamous usually 4—5-merous, petals 3—5, rarely O. Stamens usually less than 10, inserted under, rarely on the disc Ovary 1-celled, or of free carpels (Buchanania) or 2—5-celled (Spondias). Ovuled 1 in each cell. Fruit a drupe.

27. Moringaceæ, p. 57. L. alternate, bi- or tri-pinnate, pinnæ and leaflets opposite, glands at base of petioles and pinnæ. Fl. pentamerous, petals unequal. Fertile stamens 5, opposite to petals, alternating with staminodes. Fr. a long 1-celled, 3-valved pod.

B.—Calycifloræ. (Cp. p. xviii.)

A zone of the receptacle or torus grows up as a tube (calyx-tube or hypanthium) bearing the sepals, petals and stamens, so that the latter are inserted at a *higher level* than the ovary is. If a disc is present, it lines this calyx-tube or hypanthium. The flowers or stamens are either '*perigynous*,' *i.e.*, when the tube is free from the ovary or only partially envelopes it or *epigynous*, *i.e.*, when the tube is *adnate* to the ovary so that the sepals, petals, and stamens appear to be inserted on the top of the ovary.

Cp. exception under Thalamifloræ, p. xviii.

Exceptions.—Calyx-tube very shallow in some Leguminosæ so that the stamens are nearly hypogynous. St. hypogynous or sub-perigynous in Samydaceæ.

28. Leguminosæ, p. 57. L. stipulate alternate, very often compound. Fls. zygomorphic or if regular, then very small. Stamens 9 or 10 or ∞, rarely fewer, perigynous or sub-hypogynous. Carpel 1, free. Ovules usually several. Fruit a pod, which may, however, be very short or septate or twisted in some Papilionaceæ.

Sub-order Papilionaceæ, p. 57. Fls. distinctly zygomorphic with dorsal petal (standard) exterior in bud and stamens more or less united, either 9 or 10. L. simple digitate or pinnate.

Sub-order Cæsalpiniaceæ, p. 81. Fls. more or less zygomorphic with corolla imbricate and dorsal petal interior in bud. St.

10 or some reduced to staminodes or absent. L. pinnate or 2-pinnate (except Bauhinia).

Sub-order Mimosaceæ, p. 92. Fls. regular 4—5-merous collected in heads or spikes. Calyx and corolla valvate. St. 8, 10 or ∝. L. 2-pinnate.

29. Rhizophoraceæ, p. 107. L. opposite, usually coriaceous and entire, stipules interpetiolar, deciduous and leaving scars. Fl. regular, small greenish 5—8-merous, stamens twice the number of petals. Ovary cells 2-ovuled. Fr. coriaceous, usually 1-seeded.

30. Combretaceæ, p. 108. L. simple, entire, exstipulate, alt. or opp. Fl. regular, calyx-tube adnate to ovary and often produced beyond it, sepals 4—5, valvate, petals 4—5 or O. Stamens twice as many. Ovary 1-celled, ovules 2—7 pendulous. Fr. usually angled or winged.

31. Myrtaceæ, p 113. L. simple, either opposite with translucent glands or alternate without glands, exstipulate. Fl. regular. Stamens ∝, epigynous inserted with the petals in the mouth of calyx-tube. Ovary 2—5-celled. Fr. 1-many-seeded.

32. Melastomaceæ, p. 115. L. opposite, entire eglandular or with black dots (Memecylon) exstipulate. Fl. regular, or slightly zygomorphic in the stamens, red or blue, 4—5-merous. Stamens twice the number of sepals, inserted with petals on the edge of calyx-tube, perigynous, or epigynous (Memecylon).

33. Lythraceæ, p 116. L. opposite, simple, entire. Fls. regular (or zygomorphic in Woodfordia) perigynous, 3—6-merous. Sepals valvate often with intermediate teeth, petals imbricate and crumpled in bud. Ovary free 2—6-celled. Ovules very many.

34. Samydaceæ, p. 118. L. alternate sometimes punctulate distichous, stipules small deciduous. Fl. regular, inconspicuous, 3—7-merous. Petals O. St. 6—10 alternating with staminodes and united at base. Capsule usually 3-valved. Seeds arillate.

35. Cactaceæ, p. 119. (Opuntia.) Stems and branches succulent, prickly. Fl. regular, large, solitary, petals numerous, imbricate, stamens ∝, epigynous Fr. fleshy, seeds numerous.

36. Araliaceæ, p. 120. Trees or shrubs, sometimes climbing. L. alternate, digitate. Fl. regular, in panicled umbels. Sepals very small. Stamens on the epigynous disc. Ovary 2-many-celled.

37 Umbelliferæ, p. 120. Herbs with compound leaves and sheathing petioles. Fls. small in simple or compound umbels.

Ovary 2-celled. Fruit small breaking up when ripe into two carpels.

38. Cornaceæ, p. 121. L. entire, exstipulate. Fl. regular fascicled. Sepals minute, petals 5—10. St. 2—3 times as many on an epigynous disc. Fr. drupaceous.

Series II.—Gamopetalæ. (Cp. pp. xvii, xxv.)

Fls. with both calyx and corolla which are dissimilar. Corolla united into a tube, at least below. Calyx persistent of connate sepals or tubular below (the tube being often a zone of the torus) (Cp. p. xxi). St. usually inserted on or adnate to the *corolla tube.*

Exceptions.—Petals very slightly coherent in some Myrsinaceæ, Oleaceæ and Plumbaginaceæ. Sepals nearly free in some Sapotaceæ, Apocynaceæ, Asclepiadaceæ, and Convolvulaceæ. Stamens free from the corolla tube in Plumbago, and some Ebenaceæ, nearly free in some Oleaceæ.

See also exceptions under Series I and III.

A.—Inferæ.

Corolla and stamens epigynous (see explanation, p. xxi).

39. *Rubiaceæ, p. 122.* Trees, shrubs or herbs with *opposite* (sometimes whorled) leaves and interpetiolar stipules. Fls. regular, with an epigynous disc. St. usually 4—5 inserted on the tube or throat of the corolla, alternating with the petals. Ovary usually 2-celled.

39 (*a*). Compositæ. A large family, chiefly of herbs, not dealt with in this list. The numerous small tubular flowers are collected into heads and often *surrounded by ligulate flowers* and the whole head by a calyx-like involucre of bracts. The stamens have connate anthers. Calyx obsolete or of hairs or scales. Ovary 1-celled.

B.—Superæ.

Corolla hypogynous (*i.e.*, *inserted on torus below the ovary*).

40. Plumbaginaceæ, p. 134. L. alternate, simple. *Fl.* regular, pentamerous, sheathed by bracts, *calyx 5-ribbed, ovary* 1-celled. Styles 5, free, ovule 1.

41. Myrsinaceæ, p. 135. L. alternate simple, generally gland-dotted, exstipulate Fl. regular. Stamens opposite the petals. Ovary 1-celled, styles connate, ovules on a free central placenta.

42. Sapotaceæ, p 136. Trees with milky juice. L. simple, entire, alternate. Fl. bisexual, 4—8-merous (or in multiples of 4). Ovary 2—12-celled. Style slender. Ovule 1 in each cell. Fr. a berry, seeds oily.

43. Ebenaceæ, p. 137. L. simple entire, mostly alternate, exstipulate. Fl. regular, usually diœcious 3—6-merous, sepal, generally enlarged in fr., stamens usually twice the number of petals, filaments variously connate at base, anthers basifixed. Ovary 4—10-celled. Stigmas sub-sessile 1—4. Ovule 1 in each cell.

44. Oleaceæ, p 141. L. simple or compound, exstipulate usually opposite. Fl regular, in cymes or panicles, calyx small. Stamens 2, filaments usually short, ovary free, 2-celled, ovules 1 or 2 in each cell.

45. Apocynaceæ, p. 143. Juice milky. L. entire, usually opposite or whorled, exstipulate. Fl. regular, bisexual, usually cymose and 5-merous. Corolla usually contorted in bud often with a corona, stamens alt. with petals, anthers often conniving and sometimes adhering to the swollen base of the stigma. Ovary 2-celled or of two distinct carpels united in the styles. Seeds often with a coma of hairs. Fr. baccate or follicular.

46. Asclepiadaceæ, p. 149. Juice milky. L. entire, opposite or whorled, stipules O or of glands. Fl. differ from the apocarpous Apocynaceæ essentially in the pollen, which forms one or two waxy, more rarely granular masses (pollinia) in each anther cell. Corona nearly always present, corolline or staminal. Carpels 2, distinct. Fruit always of 2 free or connate follicles and seeds winged or comose. Chiefly twiners.

47. Loganiaceæ, p. 157. Juice not milky. L. opposite, simple, with usually interpetiolar stipules or raised lines. Fl. regular, 4—5-merous, ovary 2-celled. Embryo straight, in copious endosperm.

48. Gentianaceæ, p 158. Herbs with opposite leaves with several principal nerves. Fls. regular or irregular, 4—5-merous. St as many as petals or reduced in the irregular flowers. Ovary 1-celled with 2 parietal placentæ.

49. Boraginaceæ (Cordiaceæ), p. 158. L. alternate, simple, exstipulate. Fl. regular, in 2-chotomous scorpioid cymes which are often corymbose (or in few-fld. racemes in Rhabdia). Calyx-lobes valvate. Corolla 4—6-lobed. Ovary not deeply divided, cells 2, each with 2 ovules, or 4, each with one ovule. Drupe with a 1—4-celled stone.

50. Convolvulaceæ, p. 163. Climbers. Juice rarely milky. L. alternate, exstipulate (or O in Cuscuta). Fl. regular, completely gamopetalous with entire or only slightly-lobed limb. Sepals sometimes free or unequal. St. 5. Carpels 2 (rarely 3—5) combined in a 2—4-celled ovary. Fr. a berry or capsule, seeds 2—4.

51. Bignoniaceæ, p. 166. Trees or shrubs. L. opposite, or crowded compound, exstipulate, leaflets opposite. Fl. generally zygomorphic. Ovary free, supported by an annular disc. Fr. an elongated capsule, the two valves separating from the dissepiment, to which the numerous winged seeds are attached.

52. Acanthaceæ, p 171. Herbs or shrubs. L. opposite, simple, exstipulate. Fl. zygomorphic with usually well developed subtending bracts and 2 bracteoles. St. 2 or 4. Ovary 2-celled. Ovules 2-several vertically 2-seriate in each cell. Capsule loculicidal, seeds seated on hard curved acute supports.

53. Verbenaceæ, p. 179. L. usually opposite or whorled, exstipulate. Fl sub-regular or zygomorphic. St. 4 or 2 (as many as petals in Symphorema). Ovary 2—4-celled, rarely 4-lobed. Style terminal. Fruit a drupe with 1—4-celled stone or with 1—4 1-seeded pyrenes.

Exceptions.—Duranta has an 8-celled ovary.

54. Labiatæ, p. 189. Mostly aromatic herbs or undershrubs, branches usually 4-sided L. opposite or whorled, exstipulate. Fl. small, zygomorphic, in dense cymes or whorls. Stamens 2 or 4 often didynamous. Ovary 4-lobed with a gynobasic style. Ovule 1 in each lobe erect. Fr. of 4 nutlets.

Series III.—Monochlamydeæ. (Cp. pp. xvii, xxiii.)

Fls. small without distinct calyx and corolla but usually with a single whorl (perianth) which may be sepaloid (green) or petaloid (coloured) or with two sepaloid whorls or both calyx and corolla altogether absent or reduced to bracteoles or scales. Fls. very often 1-sexual. Perianth leaves free or united into a tube below.

Exceptions.—Some Euphorbiaceæ have calyx and corolla.
Some Loranthaceæ have an outer calyx-like whorl (calyculus). See also exceptions under Series I and II.

55. Piperaceæ, p 191. Aromatic herbs. L. alternate, entire, palmi-nerved, stipules membranous, intrapetiolar enclosing the buds. Fl. usually diœcious and without perianth on a fleshy axis with peltate bracts, stamens 2—6. Berry 1-seeded.

56. Lauraceæ, p 191. Aromatic trees (rarely, *Cassytha*, a leafless parasite) exstipulate. Perianth regular, 2-seriate usually 6-cleft, or O, stamens perigynous, in 3—4, 3-merous whorls (one usually reduced to staminodes), anther-cells 2 or 4, opening by valves. Ovary 1-celled, 1 ovuled.

57. Loranthaceæ, p. 193. Parasitic shrubs. L. entire coriaceous or O. Fl. racemed or fascicled, often with an entire or toothed calyculus, perianth short or long and tubular below, green or coloured. Stamens opposite the perianth-lobes. Ovary inferior, 1-celled, ovule 1, adnate to the ovary walls.

58. Santalaceæ, p. 194. A small tree. L. oppo. entire, exstipulate. Perianth coloured 4—5-merous. Stamens opposite to lobes, ovary 1-celled ultimately half-adnate to the perianth tube. Ovules 2—3 on a central placenta. Fruit 1-seeded, drupaceous.

59. Euphorbiaceæ, p. 195. Juice sometimes milky. L. alternate (exc. Trewia), simple, stipulate. Fl. 1-sexual, sometimes reduced to a single pedicelled stamen or ovary (and then united into involucrate clusters). Perianth usually 3—5-merous, 1—2-seriate or O, petals rarely present. Stamens 3 or 5 or ∞, frequently in a central column Ovary usually of 3 carpels, sometimes more, more or less united, ovules 1 or 2 in each cell, axile.

60. Ulmaceæ, p. 209 L simple distichous, stipulate. Perianth 4—9-lobed, stamens opposite to perianth-lobes, rarely twice their number. Ovary of 2 carpels, 1-celled, ovule 1, pendulous.

61. Moraceæ. p 210. Juice usually milky. L. usually alternate, stipules large, often intrapetiolar and leaving annular scars. Fls. minute densely aggregated in spikes or heads, or outside or inside fleshy receptacles (figs.) Carpels 2. Ovary 1-celled, ovule 1, pendulous.

62. Urticaceæ, p. 220. L. alternate or opp. stipulate usually basal-nerved. Fl. in small heads or cymes, heads often spiked. M. usually 4—5-merous. Fem. with 2—5-toothed or —partite perianth stamens 4 or 5, opposite to perianth-lobes. Ovary with only 1 style and stigma. Ovule erect, orthotropous.

63. Salicaceæ, p. 220. L. alternate, simple, stipulate. Fl. diœcious, in close bracteate spikes one fl. in the axil of each bract. Perianth reduced to 1 or 2 glands. St. 2 or more. Ovary 2—3-carpellary, 1-celled with parietal placentation and many ovules. Seeds with a tuft of hairs.

Class II.—Monocotyledons. (Cp. p. xvii.)

This class includes Palms, Bamboos and grasses and a large number of herbs with generally tuberous roots. A section of the stem does not show successive rings of bark, wood and pith (though it will often show *concentric leaf sheaths wrapping round the stem proper*), but the fibro-vascular bundles are scattered in the tissue of the stem which is denser towards the circumference. Parts of flowers usually in threes. Leaves with parallel nerves. (exc. Dioscoreaceæ) or palmate.

64. Zingiberaceæ, p 222. Herbs with radical leaves or a leafy stem. Flowers in spikes from root or top of stem, very irregular. Only one perfect stamen, the other two stamens of inner whorl converted into a petaloid lip and whole of outer whorl absent or changed into staminodes.

65. Musaceæ, p. 223. Wild plantains. L very large on a leafy stem formed of their convolute sheaths. Fls. 1-sexual in the axils of large bracts in a close spike. Stamens 5 perfect

66. Amaryllidaceæ, p. 223. Flowers regular 1- or 2-sexual usually showy, sometimes small, with a petaloid perianth and inferior 3-celled ovary and 6 perfect stamens.

67 Dioscoreaceæ, p. 224. Climbers with palmi-nerved simple or digitate leaves. Fls. diœcious inconspicuous spicate. Ovary inferior 3-cornered and 3-celled. Fruit a leathery 3-winged capsule with winged flat seeds. Bulbils often present in leaf axils.

68. Liliaceæ, p. 229. As in Amaryllidaceæ, erect or climbing, but *ovary superior*. In Asparagus the leaves are reduced to scales with what *look like* acicular leaves (cladodes) *in their* axils.

69. Palmæ, p. 231. Stem solid, usually unbranched (climbing and prickly in the canes) in most genera with a terminal crown of pinnately or palmately divided leaves, which are plicate in bud. Inflorescence with large sheathing bracts, fl. 1—2-sexual, 3-merous, usually dry or fleshy. St. 3, 6 or many. Carpels 3, free or combined into a 1—3-celled ovary.

70. Typhaceæ, p. 233. Herbs with large grass-like leaves and minute fls crowded together in a cylindrical dense spike at the top of the stem, of which the upper are males. Perianth of capillary hairs or O. St. 1—7. Ovary 1—2-celled. Fruit minute 1-seeded.

71. Cyperaceæ, p. 233. Herbs with grass-like leaves. Stems solid often 3-cornered. L. 3-ranked with closed sheaths. Fls. of stamens or pistil or both, situated in the axils of imbricate bracts (glumes). Perianth O or of 2—6 scales or bristles. Anthers basifixed. Glumes spiral or imbricate in small spikes (spikelets) without opposed bracts (pales).

72. Gramineæ, p. 235. Grasses, stems often hollow, terete, with solid swollen nodes. L. 2-ranked with split sheaths and usually a ligule at mouth of sheath. Spikelets composed of distichous imbricating bracts (glumes) of which the two lowest are usually empty (*i.e.*, without stamens or pistil). Bracteoles (pales) opposed to the glumes usually present in the flower-bearing glumes, anthers versatile.

ABBREVIATIONS.

Names of Localities.

Bal.	Balaghat.	Bil.	Bilaspur.
Bhan.	Bhandara.	C. P.	Central Provinces.
N. Ward.	Nagpur-Wardna.	N. Ch.	North Chanda.
Rai.	Raipur.	S. C.	Southern Circle.
S. Ch.	South Chanda.		

Languages.

Bhum.	Bhumia.	Chh.	Chhatisgarhi.
H.	Hindi.	Mar.	Marathi.
Tel.	Telugu.	Vern.	Vernacular (where language is doubtful).

Botanical abbreviations.

In addition to those used in the Key and given on page 270 the following are used :—

alt.	alternate.	Anths.	anthers.
-fld.	-flowered.	gl.	glume.
lflts.	leaflets.	opp.	opposite.
prs.	pairs.	spkts.	spikelets.

Other abbreviations.

F. B. I.	Flora of British India.
Syn.	Synonym (Synonyms are only given where the name differs from that used in the Flora of British India or Forest Trees).
W. P.	Working Plan.

List of Trees, Shrubs and Economic Herbs of the Southern Circle, Central Provinces.

I.—RANUNCULACEÆ.

So far neither **Clematis** nor **Naravelia** have been recorded but **Clematis** is common in Pachmarhi and is also found in Nimar. It will probably occur in the Maikal hills.

1. Clematis triloba, *Heyne.*

Climbing shrub. L. opposite simple or ternate with the leaflets simple or 3-lobed. Fls. very pretty 1·25—1·5″ diam. with cuspidate sepals.

II.—DILLENIACEÆ.

Fls. 3—4″.	Fr. 2″	aurea.
Fls. 1″.	Fr. ·75″	pentagyna.

2. Dillenia aurea, *Sm.* Kalli, *Baiga;* Kalla, Karmata, *Gond;* China Kalanga, *Tel.*

A small crooked tree with large leaves which have a distinct petiole 1—3″ long. Blaze dark crimson with light crimson border, wood brownish.

Fls. large yellow, *Apr.—May.* Fr. *May—June.* The fruits are eaten.

Found in all divisions and will almost certainly occur in the Northern Circle. Common in the Harratema and Balabehra forests in Raipur. Both above and below the ghat in Bal. On white clay schists, Kukra (Dhansua range, Bal.); Chhaparwa to Lamni common, Lormi forests and Pantora range (Bil.); Elchil (S. Ch.). Most frequent on metamorphic rocks especially clay schists.

3. Dillenia pentagyna, *Roxb.* Kalla, Kalli, *Gondi;* Mirchi, *Baiga;* Pedda Kalanga, *Tel.;* Kankera, *Mar.*

A straighter tree with even larger leaves and short amplexicaul petiole. Blaze light crimson, often streaked with white. Fls. yellow, medium, in clusters on the bare branches.

Fls. *Mar.—Apr.* Fr. smaller, eaten, *May.*

Less common and requiring moister localities.

Bhandara (Pertabgarh range); Bal.:—in valleys, Batkari, Nahara valley (Dhansua range), Dhiri-Mangli. Bil.:—Lormi forests (Chhaparwa, etc.), Sonakhan range, Rai.; Elchil (S. Ch.); Durgapur, Moharli range (N Ch.). Cut back by frost at Kara (Dhansua range, Bal.), where both Dillenias are found in association.

III.—ANONACEÆ.

A.—St. closely packed with overlapping connectives which conceal the anther-cells.

1. Outermost perianth series small sepaloid, inner two series larger sub-similar ... Polyalthia.
2. Innermost (3rd) series of perianth leaves very small or obsolete ... ... Anona.

B.—St. loosely imbricate, connectives not concealing the anther-cells.

1. Outer two series of perianth leaves small sepaloid, innermost (petals) larger, petaloid.
   Base of petals not saccate. Ovules 1—2 Miliusa.
   Base of petals saccate. Ovules 6-many Saccopetalum.

4. Polyalthia cerasioides, *Benth. & Hook. f.* Kala Karai, Lahan Karai, *H., Mar.;* Chilka dudhi, or duduga, *Tel.*

A small straight tree with numerous spreading branches, distichous lanc. or oblong-lanc. pubescent leaves and usually solitary axillary greenish fls. on the new shoots. Bark rough grey, blaze yellow. Fruit an umbel of red fleshy carpels.

Fls. *Apr.—May.* Fr. *May—Aug.* Evergreen.

A tree of the moister forests only, Amjhar nala, Kanhargaon, Harunpaili block, etc. (S. Ch); Haveli range (N. Ch.).

5. Polyalthia longifolia. *Benth. & Hook,* Debdar, *H.*

Sometimes also called Asok, a name also applied to **Saraca indica.** A straight tree with long narrow shining undulating leaves, often planted.

6. Miliusa velutina, *H. f. & T.* Dom sal, Kari, *H.;* Karli, *Gondi;* Pedda chilka duduga, *Tel.* (S. Ch. W. P.).

A tree rarely over 3 ft. in this circle with large ell. or ovate leaves 4 to 10" long, more or less permanently pubescent beneath. Fls. green on long drooping pedicels, on new shoots. Bark brown or grey, usually fluted. Blaze thick brown with lighter streaks.

Fls. *May.* Fr. *June.* Deciduous.

Fairly common in the damper forests of Balaghat, Baiha range, Sulsuli, etc.; Pantora range (Bil.), frequent.

7. Saccopetalum tomentosum, *H. f. & T.* Kari, *H.;* Thoska, *Gondi;* Kutki, *Gondi* (Bal. W. P.); Chilka dudi, *Tel.* (S. Ch. W. P.); Minmara, *Gondi* (*f.* Donald).

A tree rarely over 4 ft. in this circle with ovate-oblong or elliptic somewhat aromatic leaves rarely exceeding 6″, pubescent beneath. Bark brown nearly smooth, fluted in old trees. Blaze yellowish, slightly pink or brown, or in older trees banded brown and white. Fls purple on slender pedicels. Fr. an umbel of black fleshy carpels, which are ·6—1″ diam.

Fls. *May—June.* Fr. *June—July.* Deciduous.

Common in all divisions. The wood is valued for house poles.

8. Anona squamosa, *L.*

The custard apple is cultivated as also, to a small extent, is

9. Anona reticulata, *L.* The Bullock's Heart.

A. squamosa is abundant semi-wild in places; as on the trap at Girur (Nag. Wardha).

IV.—MENISPERMACEÆ.

M. fl.—4-merous. Fem. perianth leaves 2,
Carpel 1. ... ... Cissampelos.
Fls. all 6-merous except the carpels.
  Pubescent. Carpels 3—6 ... Cocculus.
  Glabrous. Carpels 1—3 ... Tinospora.

10. Tinospora cordifolia, *Miers.* Gulbel, *Mar.*

Climbing shrub with succulent corky stems, entire ovate-cordate, glabrous leaves 3—3·5″ and minute yellow fls. in racemes longer than the leaves. Fruit, dense racemes of green or scarlet berries, mostly in threes, each triad being the 3 ripe carpels of single flowers. It sends down numerous long fleshy slender roots from the branches.

Fls. *Aug.—Oct.* Fr. *Oct.—Nov.*

Nag. Wardha (Telinkheri, Bori, Girur).

11. Cocculus villosus, *DC.* Wasan, *Mar.*

A slender grey villosely tomentose climber with deltoid to ovate-oblong obtuse leaves attaining 3″ by 2′ and axillary small capitate cymes of minute fls. Druplets dark purple. Common everywhere in hedges, etc.

Fls. *Nov.—Feb.* Fr. *Apr.*

It is said to gelatinize water when the triturated plant is mixed with it.

12. Cissampelos Pareira, *L.* Pahadmul, *Mar.;* Kurupahad, Kalupahad, *Gondi.*

A slender climber with slender rhizomes to which it often dies back in the hot weather. Leaves often broader than long and usually peltate. Fls. minute. Male in corymbose cymes and females in the axils of large bracts in racemes. Common.

Fls. *June—Oct.* Fr. *Nov.—Jan.*

V.—CAPPARIDACEÆ.

L. 3-foliolate. St. adnate to the base of the gynophore	... Crataeva.
L. simple St. on torus at the base of the long gynophore	... Capparis.

13. Crataeva religiosa, *Forst.* Uskeman *Tel.;* Pilu, Katshawri, *Mar.;* Biliana, *H.* (*f.* Donald).

A small tree with 3-foliate leaves and yellow and white flowers in corymbs. Ovary on a very long gynophore. Fls. *Mar.—Apr.* with the new foliage.

It is sometimes cultivated in gardens, and is entered as wild ("a moderate-sized tree with 3-foliate leaves") in the Moharli W. P. under the name of Karangi pipal. Wild and sub-gregarious at Patanil (S. Ch.), *fide* Donald.

14. Capparis grandis, *L. f.* Pachara, *Mar.*; Pachunda, Katarni, *Mar.* (*f.* Donald); Regguti (N. Ch. W. P); Regoti chetu, *Tel.*

A small tree with pubescent often drooping branches, sometimes thorny. L. broad 2—3", often roundish, velvety beneath. Fls. ¾—1" diam., white

Fls *May—Oct.*

Nag. Ward (Bapuwara forest); N. Chanda; usually on cotton soil; S. Chanda.

Pieces of its wood are strung together through the pith and worn as a charm.

15. Capparis horrida, *L.* Waghoti, *Mar.*; Reguti, Adonda, *Tel.* (S. Ch. W. P.); Ketauni (N. Ch. W. P.); Jhira, *H.*

A scrambling or climbing shrub with rusty pubescent shoots and stout recurved thorns. L. from narrow elliptic to orbicular-obovate and retuse, attaining 2·5", shining above. Fls. above the axils, white to pink, irregular, sub-solitary or several in vertical lines. Berry 1½" long.

Fls. *Feb.—Apr.* Fr. *June.*

All divisions, frequent.

16. Capparis sepiaria, *L.*

A straggling or climbing shrub with pale grey branches and recurved thorns. L. mostly under 1·5″ retuse. Fls. small white on very slender pedicels in umbels. Berries small black, size of a small pea.

Fls. *May—Dec.* Fr. *Nov.—Dec.*

Pipalkhot (N. Ch); Dhaba range and Sironcha (S. Ch.); Chorbaoli (N. Ward.)

VI.—BIXACEÆ.

17. Cochlospermum Gossypium, *DC.* Galgal, *H.;* Gongal, *Mar.;* Ganeri, *Bhum.;* Konda gogu, *Tel.* (S. Ch. W. P.); Burkachetu, *Tel.*

Small tree with light fluted bark and spongy wood. Blaze deep brown on outside, then streaked brown and white. A deep orange-coloured juice exudes from near the cambium. Large yellow fls. while leafless, and palmately lobed leaves.

Fls. *Jan.—Mar.* Fr. *Mar.—June.*

Dry localities. All divisions, common.

18. Flacourtia Ramontchi, *L'Herit.* Kakai, *H.;* Gandregu, *Tel.* (S. Ch. W. P.); Kanki. Katian, *Gondi* (Bal. W. P.); Giam chetu, *Tel.*

A small tree or shrub, usually thorny. Blaze rather hard, pale brown. Leaves crenate-serrate usually obovate or ell. Fls. yellowish-green diœcious ·25″ diam.; females in few-flowered racemes, males conspicuous from their yellow anthers, often clustered. Fruit a red berry ⅛″ to ½″ diam., edible.

Common in all divisions. Frequent as a shrub in scrub ungles.

Fls. *Dec.—Mar.* Fr. *Apr.—May.*

VII.—POLYGALACEÆ.

19. Polygala chinensis, *L.* Bijnori, *Gondi.*

A small plant 3—5″ high, leafy especially towards the top, with pubescent stem, variable leaves 1½′ to 3½″ long, and terminal and lateral, capitate or sub-capitate, racemes of greenish or pink zygomorphic flowers. Capsule 2-seeded membraneous.

Fls. *June—Nov.*

The dried roots come into the market as cylindrical brown and wrinkled pieces about 3″ diam. It is included in some of the leases for Minor Forest Produce.

Specimens received from Messrs. Beechy & Cole.

VIII—TAMARICACEÆ.

20. Tamarix ericoides, *Rottl.* Jhao, *H., Mar.*

A shrub with erect branches clothed with minute sheathing amplexicaul leaves and with 2-sexual pink flowers in terminal racemes. Conspicuous in fruit from the long pointed 2-valved capsules and plumed seeds.

Fls., fr. *Oct.—Aug.*

River-beds, frequent. Katangi (Bal.); Belda (N. Ward.), etc.

IX.—DIPTEROCARPACEÆ.

21. Shorea robusta, *Gaertn.* The Sal tree. Sarai, *Gondi;* Pinjal, *Gondi* (Bal. W. P.).

Fls. *Feb.—Mar.* Fr. *June—July.*

Bastar, Bil., Bal, Rai., usually following the line of the metamorphic rocks. Not found in the driest localities. It suffers from frost in some of the valleys of Baihar, Raigarh and Lormi Ranges.

X.—MALVACEÆ.

The numerous undershrubs in this family are included on account of them or their allies yielding valuable fibres. The fibre of species of **Sida** has been compared with the very finest Calcutta jute, but it is probable that these species would have to be cultivated to become commercially valuable.

A. Shrubs or herbs, mostly undershrubs. Androecium tubular (filaments above tube long in some Abutilon).
I.—Carpels numerous (8—12). Ovules 1 in each cell. *Fls. yellow. Bracteoles 3* ... *Malvastrum.*
II.—Carpels numerous. Ovules 2 or more in each. Fls. orange. Bracteoles O ... Abutilon.
III.—Carpels 5 (rarely 4, sometimes 6—10 in Sida). Ovule 1 in each cell Fruit breaking up into cocci.
Bracteoles O. Styles as many as carpels. *Fls. yellow or straw coloured* ... Sida.
Bracteoles 5. Styles 10. Fls. pink ... Urena.
Bracteoles 10—12 filiform. Styles 10 ... Pavonia.
IV.—Carpels 3—5. Ovules 3 or more in each cell. Fruit capsular.
Bracteoles 5 or more (O in Solandra). *Stigmas spreading distinct* ... Hibiscus.
Bracteoles 4—8 small. Stigmas coherent in a club ... ... Thespesia.
Bracteoles 3 large. Stigmas coherent in a club (Cotton) ... ... Gossypium.
B. Trees. Filaments all or some free above the base usually in 5 groups.
L. simple or lobed. Bracteoles 4—5 ... *Kydia.*
L. digitate. Bracteoles O ... ... Bombax.

22. Malvastrum tricuspidatum, *A. Gray.*

An undershrub with straw yellow flowers liable to be mistaken for **Sida** from which it may be easily distinguished by the bracteoles.

N. Ward An introduced plant

23. Sida veronicæfolia, *Lamk.*

An undershrub 1—3 ft. high (or sometimes herbaceous and procumbent) with sub-orbicular or ovate-cordate leaves and pale yellow flowers on slender peduncles without bracteoles.

In all divisions. Fls. cold season, and also sporadically throughout the year.

Yields a fibre.

24. Sida glutinosa, *Roxb.*

Similar but always erect, usually taller 2—3·5 ft., with dense glandular hairs in addition to long villi. L attain 3″ by 2·7″, smell strong.

Fls. *Aug.—Dec.*

Nag. Ward.; S. Ch (Marnil).

25 Sida spinosa, *L.*

With cordate pubescent leaves and 1—3 spiny tubercles below them.

Fls. *Aug.—Oct.* Common.

26. Sida cordifolia, *L.*

An erect undershrub 2—4 ft. tomentose all over with ovate-cordate obtuse leaves and straw coloured fls. ½″ diam. Carpels with long awns.

Fls. *Aug.—Dec.* Fr. *Oct.—Jan.*

27. Sida rhombifolia, *L.*

Undershrub 1—4 ft. with thin or thick stellate hairs on the branches and rhomboid or obovate leaves with cuneate 3-nerved base.

Very common but especially in open situations in the rains and cold weather.

28. Sida acuta, *Burm.*

Undershrub 2—3 ft. high with very tough sparsely stellate hairy stems and lanceolate to ovate-lanceolate serrate glabrous leaves 1½—3½″ long.

Fls., fr. *Aug.—Dec.*

Waste ground, common.

29. Urena lobata, *L.*

Undershrub 2—4½ ft. high with sub-orbicular angled or slightly lobed leaves and pink flowers ¾″ diam., not racemose. Carpels glochidiate.

Fls., fr. *Aug.—Dec.*

Very common.

30. Urena sinuata, *L.*

Similar but the leaves cut beyond the middle into usually 5 oblong or lanceolate segments. Fls. 1″ diam.

Frequent in all divisions.

31. Urena repanda, *Roxb.*

Shrub 2—4 ft. with roundish leaves 2½—3½″ diam. and pink fls. ½—1″ diam. which are axillary and racemed. Carpels smooth.

Fls. *Sep.—Oct.* Fr. *Nov.—Dec.*

Glades in the forests. Bil., Bal. Probably in all divisions.

32. Pavonia odorata, Willd.

An erect suffruticose herb, 2—3 ft. high, glandular pubescent all over with simple slightly lobed leaves ·5—2″ long rounded to ovate-lanceolate. Fls. pink. Carpels hairy. The 10—12 linear hairy bracteoles ·4′ long are characteristic.

Fls. *r.s.* Fr. *Nov.—Dec.*

South Chanda, etc.

33. Pavonia zeylanica, *Cav.*, is very similar, but the leaves are more deeply lobed and the carpels slightly winged.

Sironcha (S. Ch.).

(NOTE.—The description of P. zeylanica in *Indian Forester*, October 1912, was taken from another species.)

34. Abutilon indicum, *G Don.*

An undershrub covered with a soft white close velvet with few or no long hairs. Fls. orange 1″ diam. Head of many carpels truncate.

Fls. *r.s.* and up to *Dec.*

Frequent, but rather local and often near villages. N. Ward.

35. Abutilon muticum, *G. Don.*

4—6 ft. high with the stems and petioles densely villosely hairy, round cuspidate leaves softly white, tomentose beneath and closely more roughly tomentose above, dentate to denticulate. Fls. orange usually on short axillary branches running out into terminal panicles. Sep. cuspidate. Carpels many, pubescent.

Fls. *Sep.* Fr. *Nov.*

Umrer range (N. Ward.).

36. Abutilon graveolens, *W. & A.*

Stouter than the last, 3—6 ft. high, covered with a velvety *tomentum* with glandular pubescent and long soft hairs intermixed. Fls. 1½" orange with a crimson centre. Similar localities. Raipur.

Key to Hibiscus.

I.—Wild species.
* Bracteoles absent or minute. Fls. small white ·5—·75" ... ... Solandra.
** Bracteoles present, at least in young flowers.
A. Calyx spathaceous.
1. Fls. white or pink. Bracteoles small caducous ... ... ficulneus.
2. Fls. large yellow. Bracteoles 4—5 lanceolate to ovate.
Branched from base, slightly bristly below. Bracteoles ·5—·75" ... tetraphyllus.
Erect, scarcely branched, very bristly all over. Bracteoles 1" ... ... pungens.
3. Fls. large yellow. Bracteoles many linear or filiform.
Bracteoles 10 setaceous ·5—·7" ... rugosus.
Bracteoles 10—15, filiform 1·5" ... cancellatus.
B. Sepals 5, nearly free or calyx 5-cleft.
1. Bracteoles linear or inconspicuous, fls. white or pink, not large.
Leaves more or less 3-lobed, glandular beneath ... ... hirtus.
Leaves entire or serrate, not glandular, corolla reflexed ... ... micranthus.
2. Bracteoles conspicuous. Fls. large or rather large, yellow.
All parts pubescent and with pungent and glandular hairs. Capsule wingless. panduræformis.
Villous. Capsule 5-winged ... vitifolius.
II.—Cultivated species. Fls. yellow or white, large. Calyx spathaceous. Fruit 5—10" ... esculentus.
Calyx with sharply acuminate lobes, midrib of each with a large gland ... cannabinus.
Calyx with acuminate lobes, fleshy and usually red, midrib without gland ... sabdariffa.

37. Hibiscus hirtus, *L.* Chendro, *H.*

An undershrub with herbaceous branches, ovate strongly serrate leaves 1—3" often with a gland on the midrib beneath and pretty red or white fls. 1" diam. with spreading corolla and 5—7 subulate bracteoles. Peduncles and calyx with strong hairs and leaves stellately hairy beneath. Capsule globose.

Fls. *Aug.*

Ghot range (S. Chanda).

38. Hibiscus Solandra, *L'Her.*

About 3 ft. high with polymorphous leaves, lower simple or 3-lobed always with sub-cordate base and coarsely toothed, upper 3-lobed or 3-sect or small and simple. Fls. not seen, they are yellow according to F. B. I but white and only ¾ to ½" diam. in the Pachmarhi plant, on long peduncles 1—2" long jointed above, arranged in loose often corymbose racemes. Capsule slightly exceeding the ·3" long calyx, 5-valved, cuspidate, sutures ciliate with bristles.

Fls. *Sep.—Oct.* Fr. *Nov.*

Sihawa forests (Rai.).

NOTE.—Roxburgh correctly describes the fls. as white under his H. pumilus. The commoner form at Kew is the Pachmarhi plant with simple leaves The Raipur plant with deeply cut hoary pubescent leaves may be Hochreutiner's var. genuinus, but the two forms are not well discriminated in his monograph.

39. Hibiscus panduræformis, *Burm.*

A tall herb up to 10 ft., lower leaves irregularly lobed, upper narrow, all coarsely irregularly toothed. Fls. axillary and in terminal racemes

1—1·25" yellow subsessile. Bracteoles linear spathulate connate at base.

Fls., fr. *Nov.—Jan.*

Rai.; N. Ward.

40. Hibiscus vitifolius, *L.* Var. (?)

A sub-herbaceous undershrub 3—4 ft. high with shortly pubescent stems. Lower leaves 4—5" diam. with three large acuminate lobes and rounded cordate base, upper lanceolate, all more or less dentate, pubescent and with long stellate hairs. Fls. large yellow, with purple centre, axillary and sub-racemose. Bracteoles 8—12 linear. Calyx large with broadly lanceolate sepals.

Easily distinguished in fruit by the winged reticulately-veined carpels which resemble those of a Pavonia (but the capsule is loculicidal).

Fls. *r.s.* Fr. *Dec.*

Bilaspur.

NOTE.—Differs from typical *vitifolius* in the large and much less tomentose or villous leaves. In the latter respect it resembles some Cingalese specimens.

41. Hibiscus cannabinus, *L.* Ambari, *Mar.*

A very variable suffruticose herb 2·5—5 ft., the stem usually with scattered small prickles, leaves from large entire and cordate to palmatifid, the uppermost often simple lanceolate and curved on long slender petioles, serrate. Fls. over 2" diam., white or pale yellow with purple eye, axillary, subsessile. Calyx campanulate with long acuminate sepals, 5 large glands, appressed white tomentum, and tubercled hairs. Epicalyx with acuminate lobes.

Fls. *Oct—Dec.* Fr. *Nov.—Jan.*

Very common. Planted on the rice bunds in rice districts and between other crops in Jowar districts. Widely cultivated for its fibre. A native of Africa, often found as an escape. Seeds used for bread, and fruit eaten by cattle.

42. Hibiscus Sabdariffa, *L.* Rozelle.

Shrubby. Glabrous except the flowers and fruit. L. with petiole often longer than blade which has a gland on midrib. Fls. 2½″ on very short peduncles. Bracteoles accrescent with calyx at base.

Fls. *c.s.*

Commonly cultivated on cotton soil.

43. Hibiscus ficulneus, *L.* Ran bhendi, *Vern.*

3—4 ft. stems nearly smooth or scabrous with tubercle based hairs or prickles. L. sub-orbicular very deeply 3—5-lobed with the rounded lobes constricted at base, and serrate. Fls. white to pink in more or less leafless racemes, 1—1.25″ diam.

Fls. *Sep.—Nov.* Fr. *Nov.—Dec*

Lohara, Balod range (Rai); N. Ward. Probably all districts.

44. Hibiscus tetraphyllus, *Roxb.*

Suffruticose herb about 3 ft. high with sparse hispid hairs on branches and 3-forked ones on the leaves. Radical leaves attain 8″ diam., cauline 3—4″ deeply or very shallowly lobed, in the deeply-lobed leaves the lobes are sometimes again lobed, always coarsely dentate or cuneate-dentate. Fls. primrose-yellow 2·5—3″ diam., axillary and racemed. Bracteoles persistent on the young fruit, 4—5 ovate-lanceolate. Capsule oblong 1·25—1·5″ beaked covered with glandular and pungent hairs.

Fls. *Sep.—Oct.* Fr. *Nov.*

Bori Majra (Nag) and probably in all divisions (The Nagpur plant is much more sparsely hairy than the type).

45. Hibiscus cancellatus, *Roxb.*

A very hirsute or bristly herb with lower leaves sub-orbicular, large yellow fls. (with purple centre) on peduncles about 1″ long in terminal racemes (and few axillary). Capsule sub-globose to oblong 1—1·75″ hirsute with yellow hairs. Bracteoles persistent filiform.

Fls. *Aug.—Nov.* Fr. *Oct.—Jan.*

Rai.; Bil ; Bal.

46. Hibiscus esculentus, *L.* Bhendi, *Vern.*

Erect 4—6 ft. Capsules long oblong.

Often cultivated.

47. Hibiscus rugosus, *Mast.* Pahari bindi, *Vern.*

Recorded in "Wild Plants found in Nagpur," by Mr. Graham.

48. Thespesia Lampas, *Dalz.* Jungli bendi Ran bhendi, *Vern.*

A stout undershrub 4—6 ft. high with large yellow fls. and crimson centre. Two varieties are distinguished in the Addenda to the *Forest Flora of Chota Nagpur* :—

(a) L. glabrescent and glaucescent beneath mostly deeply 3-lobed with very acute or acuminate lobes. Capsule 3- rarely 4-valved, oblong ·6—·8″ cuspidate, readily dehiscent.

Common in all divisions.

(*b*) L. stellately tomentose beneath mostly simple and entire or with shallow blunt lobes Capsule 5 rarely 4-valved ·7—1" broad ovoid blunt, tardily dehiscent, woody.

This has only been noted from South Chanda.

Both species and varieties fl. *r.s.* up to *Oct.* and fr. *c.s*

49. Kydia calycina, *Roxb.* Banga, *Gondi* (Chh. ?); Baranga, *H.;* Warang, *Mar.;* Potrimarra, *Gondi;* Botki, *Tel.* (S Ch. W. P.)

The names Dhaman and Bhoti are often given from confusion with other trees.

A tree, small to m. s., with sub-orbicular palmately 5—7-nerved leaves, with a gland on 1—3 of the nerves beneath. Blaze white, faintly pink at the margins. Fls. m. s., white in panicles from *Sep.* to *Nov.* conspicuous in fruit from the 4—6 persistent spreading bracteoles.

Common in all divisions.

50. Bombax malabaricum, *DC.* Saori, *Mar.;* Burga marra, *Gondi* (S. Ch. W. P.); Burka burgee, *Tel.* (S. Ch. W. P.); Burugu, *Tel.* (Donald); Simar, Semal, *H.* Silk cotton tree.

A well-known tree of which a nearly spineless variety with smaller deep red fls. is common in the C. P. Blaze thick soft dark pink streaked with pale pink and white.

Fls. *Jan.—Mar.* Fr. *Mar.—May.*

It grows best in sandy alluvial soil but nowhere attains the dimensions which it reaches in some other parts of India. It is one of the trees favoured for matches at Kota in Bilaspur.

XI.—STERCULIACEÆ.

1. Calyx petaloid. Petals O. Anthers
   in a ring on the column ... Sterculia.
2. Petals present. Stamens combined below dilated above
   into a cup with stipulate anthers on the margin.
   Large shrub. Fls. red. Fr a
   narrow spiral capsule ... Helicteres.
   Tree. Fls. white. Fr. a large
   capsule ... ... *Pterospermum.*
3. Trees or large shrubs. Petals present. Fls. yellow.
   Stamens combined into a tube below
   with numerous anthers ... Eriolæna.
4. Undershrubs.
   Stamens 5 tubular at base only.
   Ovary 5-celled ... ... Melochia.
   Stamens 5 tubular at base only.
   Ovary 1-celled ... ... Waltheria.
   Stamens 5 fertile and 5 staminodes, tubular below.
   Ovary 5-celled. Capsule spiny... Buettneria.

51. Sterculia urens, *Roxb.* Kudlu, *Mar.;* Kurlu, *Chh.;* Karu, *H.;* Tabai marra, *Gondi* (S. Ch. W. P.); Tabsu, *Tel.* (S. Ch. W. P.), Kasai (N. Ch. W. P.)

A large tree with white papery bark, large palmately lobed leaves and panicles of greenish fls. (while leafless). Lobes of leaves often very shallow, glabrous. Follicles pungent with bristles.

Common on rocky hills. Fls. *Dec.—Feb.* Fr. *Apr.*

Yields a gum and fibre. Planks are sometimes cut from it.

52. Sterculia villosa, *Roxb.* Buti (N. Ch. W. P.), Udal, *H.*

A large tree with light grey not papery bark, large palmately lobed leaves of which the lobes are often 3-partite. Fls. yellowish and pink.

Raipur ; Bil. In valleys, not common.

Planks sometimes cut from it. Bark yields a strong fibre.

53. **Sterculia colorata,** *Roxb.* Kanhakum, *Tel.;* Dada mara, *Gondi.*

A large or m. s. tree very beautiful in fl. with its scarlet inflorescence. Outer bark brown roughish, blaze rather thick yellow, inside white. L. usually only 3-lobed in the adult (often more in seedings) with only scattered stellate hairs.

Fls. *Apr.* Fr. *May.* Deciduous *Feb.—May.*

Hillsides and well drained valleys. Rai. (Salebhat); Dhiri-Mangli, Bihar and Raigarh (Bal), on the ghats ; Machlighatta (S. Ch.).

54. **Helicteres Isora,** *L.* Marorphal, *H.;* Athai, *Mar.;* Muradphali (Bhan.); Nuldanti, *Tel.* (S. Ch. W. P.) ; Bangar, *Gondi.*

A large shrub with oblique pubescent 5—7-nerved leaves and scarlet lateral zygomorphic fls. Fruit woody of 5 spirally rolled carpels on a long gynophore.

Fls. *Apr.—Dec.* Fr. *Oct.—Jan.*

Common chiefly in rocky places on the cool slopes of hills but also elsewhere.

Mr. Cole states that the fruits pounded and fried in ghee, and sweetened, are used for colic and diarrhœa. As this is also the case in Chota Nagpur, they would appear to have some virtue.

55. **Pterospermum acerifolium,** *Willd.* Muchkand, *H.*

A handsome tree with palmately nerved cordate-based leaves white tomentose beneath and large white flowers.

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Fls. *Apr.—May.*

Only near villages and often planted in gardens.

56. Eriolæna Hookeriana, *W. & A.* Bhoti *H.;* Bhondia Dhaman, *Mar.;* Kunjai, *Gondi* (Bal.); Nar hotku, *Tel.* (S. Ch. W. P.); Kutki, *Gondi* (Bal. W. P.), (N. Ch. W. P.). Sometimes called Bhoti Dhaman.

Shrub or small tree with broadly cordate coarsely toothed 7—9-nerved leaves white tomentose beneath. Yellow fls. 1½—2" diam. and ovoid tubercled capsules. There are large pinnatisect deciduous bracteoles beneath the fls.

Fls. *Apr.—June.* Fr. *Nov.—Jan.*

Wood is strong. Used for axe handles.

57. Melochia corchorifolia, *L.* Methuri, *Vern.*—Graham.

An undershrub with serrate plaited leaves and small white or pink fls. collected in dense heads. Common.

Fls. and fr. *r. s.*

58. Waltheria indica, *L.* Halduli, *Mar.*

A hoary tomentose undershrub, 2—5 ft. high, with velvety ovate or ovate-oblong sub-plicate leaves rarely 3" long and small yellow or pink fls. in capitate cymes.

Fls. *r. s.* and *c. s.*

Exceedingly common on the open quartzite and sandstone plateaux of Raipur and (Sonakhan range) Bilaspur, where it forms a gregarious undergrowth. Frequent also in other divisions in open dry jungles.

59. Buettneria herbacea, *Roxb.*

A branched herb with woody root-stock and curious small purple fls., remarkable for the long slender tips and 2-fid. appendages of the petals.

Common in rocky forests.

XII.—TILIACEÆ.

Trees or shrubs. Petals often with a gland at base.
Fruit drupaceous ... ... Grewia.
Undershrubs or herbs. Fls. in dense cymes. Petals eglandular.
Fruit dry echinate ... ... Triumfetta.
Annuals. Peduncles 1—3-flowered. Fr. capsular ... ... Corchorus.

I have followed the grouping of the species in Grewia which is adopted in my *Flora of Chota Nagpur*. Mr. Drummond has recently, however, published an exhaustive account* of the synonomy of the Grewias of Roxburgh which, though it does not modify my ideas of the limitation of the species, calls for a few changes in the nomenclature which I have introduced. I regret that Mr. Hole's work on Grewia is not at present available to me for consultation.

Key to Grewia.

A. Fls white, or sepals first white then turning colour inside.

Shrubs or undershrubs (exc. disperma). Top of gonophore for top of pedicel in flavescens ciliate or hirsute.
I.—Stigma capitate of radiating long papillæ. Pet. under ·25" half or not half as long as the sepals.
Peduncles very short. L. ovate-oblong or ovate-lanceolate ... ... hirsuta.
II.—Stigma with 4 linear arms Pet. over half as long as sepals. *Sub-scandent shrub* ... ... flavescens.

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* Published in the *Journal of Botany*, November and December 1911. First part only received.

III.—Stigma peltate, more or less lobed (4—5 lobes in abutilifolia which are sometimes deciduous leaving it capitate).

Shrub L. large sub-orbicular. Fr. ·75—1″ globose ... ... abutilifolia.

Tree or shrub. L. lanceolate. Fr. didymous or 4-lobed ... ... disperma.

B. Fls. bright yellow. Stigmas peltate, lobed or somewhat fimbriate when old or sometimes 2-fid in *elastica*. Top of gonophore (when present) without long hairs, though sometimes pubescent. Ovary villous.

I.—Shrubs or undershrubs. Peduncles ·5—1·25″ slender, much exceeding minute petioles

Undershrub. L. oblong to sub orbicular, not white beneath ... ... sapida.

Shrub L. lanceolate, white beneath ... Rothii

Shrub. L. sub-orbicular, thin, white beneath (cultivated) ... ... asiatica.

II.—Trees

(*a*) Petioles ·5 or more slender (or tip thickened). L. glabrescent, very oblique or auricled at base. Fr didymous.

Bark nearly smooth, blaze light coloured ... *tiliæfolia*.

(*b*) Petioles under ·5″ stout (exc. sometimes rotundifolia . L. hoary or tomentose or sometimes glabrescent in celtidifolia) beneath.

Bark rough, dark Blaze dark crimson. Fls. tomentose on slender peduncles exceeding the ·2—·3′ long petioles ... rotundifolia.

Bark smooth or nearly so, blaze pale pink or streaked. Fruit globose ... celtidifolia.

60. Grewia hirsuta, *Vahl.* Gursukri, *H.*; Ghatarni, Kolate, *Mar.*; Jiblikichetu, *Tel.*

A shrub 2½—4 ft. high, usually with many stems from the root, stellately tomentose or stellately villose all over, with narrow oblong to ovate-lanceolate or broadly oblong serrulate, very shortly petioled leaves. Fls. polygamous or 1-sexual white, or sepals first white then turning colour inside. Buds ovoid under $\frac{1}{4}''$. Fr. pilose with long deciduous hairs, fleshy and sweet with a crustaceous rind.

Fls. *July—Sep.* Fr *Nov.—Jan.*

Found in the forests in all divisions. Fr. eaten and is given in dysentery and diarrhœa.

61 Grewia flavescens, *Juss.* (Syn. G. pilosa of Flora of Chota Nagpur and of Mr. Witt's List for Berar.)

A large sub-scandent shrub with sharply 3—4-angled stems. Branches, leaves and inflorescence hirsute with stellate hairs, not villous. L. oblong or broader upwards, usually cuspidate. Flower-buds oblong mostly constricted in the middle, $\frac{1}{3}$—$\frac{1}{2}''$ long before opening. Stigmas 4 spreading. Fr. closely covered with very *short* stellate hairs. Dhaba and Ghot Ranges (S. Ch.).

62. Grewia abutilifolia, *Juss.* Adaia, *Mar.*

(A specimen of this plant from Chota Nagpur was wrongly named for me G. sclerophylla, *Roxb.*, which is *not* a synonym, and hence G. sclerophylla in the *Flora of Chota Nagpur* is an error.)

A coarse bushy shrub about 4 ft. high with stellately tomentose branchlets, large roundish or broadly elliptic leaves, often somewhat 3—4-lobed, serrate or denticulate closely stellate, especially beneath. Petiole ·5—1″. Fls. ·7—·9″ diam. white in subsessile axillary umbels, the petals only ·1″ long. Fr. globose $\frac{3}{4}$—1″ diam. with 2—4 rugose pyrenes. (The fruit is much shrunk in dry specimens and therefore usually described as $\frac{1}{3}$—$\frac{1}{2}''$ diam.).

Fls. *Aug.* Fr. *Nov.—Feb.*

(The old dry fruit remains long on the branches.) More or less evergreen. Balod range and North Sihawa (Rai.); N. and S. Ch.; Nagpur.

63. Grewia disperma, *Rottl.* (Syn. G. lævigata, *Vahl.*). Ghaturli, *Mar.* (S. Ch. W. P.)

A small tree with shortly pubescent slender branchlets. L. narrow 3·6″ by 1½—2″. Fls. white, 1—1½″ diam. succeeded by simple, 2-lobed, or 4-lobed green fruits.

Fls. *June—Oct.* Fr. *Dec.—Mar.* Evergreen.

Chiefly along nalas on metamorphic rocks.

S. Ch., frequent; Sitanala, etc., (Rai.); nala on Southipahar 2,000 ft. Pantora range (Bil.); Baihar and Raigarh (Bal.); Lormi forests (Bil.).

64. Grewia tiliæfolia, *Vahl.* Kesela, *Gondi*; Dhaman, *H.*; Kesalmara, Kasui, *Gondi* (Bal. W. P.); Tara, *Tel.*

A naturally straight tree with very broadly ovate to obovate mostly unequal-sided leaves, slender petioles up to 1″ long usually thickened at the top, mostly *falcate* stipules and numerous yellow fls. with their peduncles shorter than the petioles. Fruits mostly *didymous.* Bark nearly smooth. Blaze fibrous, pink or red, made up fine alternating zones of crimson and white.

This is the 'Dhaman' *par excellence*, the cordate base of the leaf is usually auricled on one side, the leaf surfaces *both* green, sub-glabrous beneath even when young, but occasionally stellate pubescent states occur together with more tomentose flower-buds when herbarium specimens are sometimes confused with 'rotundifolia.' The short peduncles and relatively long petioles of 'tiliæfolia' will then usually be a safe guide. Petals of tiliæfolia are also much shorter.

In the field the smooth grey bark of 'tiliæfolia' compared with the rougher black bark of 'rotundifolia' and the habit and blaze easily discriminate the two.

Fls. *May—June.* Fr. *Sep.—Oct.*

Common in all divisions.

Largely cut out for bhangy poles, etc.

65. **Grewia sapida,** *Roxb.* Phalsa, *H.*

An undershrub with annual (or often perennial, if not burnt) shoots from a woody root-stock, broadly oblong to sub-orbicular or obovate obtuse or acute leaves, green or hoary beneath usually with a cuneate 5-nerved base, very short petioles and very long peduncles ½—1¼". Fruits globose or somewhat lobed.

Fls. *Apr.—June.* Fr. *May—July.*

Topla, etc. (Bal.), frequent; Bil.; and probably other divisions.

Fruit eaten.

66. **Grewia celtidifolia,** *Juss.* *Vide* Drummond in Journal of Botany, page 300 (Syn. G. elastica, *Royle*, and G. vestita, *Wall.*, and G. eriocarpa, *Juss.*, *fide* Drummond). Dhaman, *Vern.*

Tree with tomentose shoots, ovate, oblong or elliptic acuminate, 5—7-nerved leaves, tomentose when young and often persistently white or tomentose beneath when old, with oblique but not cordate base. Petioles short, usually under ·5″ in large leaves, stout, uniform or somewhat clavate. Stipules linear to setaceous. Peduncles few to many usually tomentose and divaricate. Bracteoles narrowly linear or setaceous. Buds sub-globose to oblong. Gonophore present or absent. Fr. globose under ¼″ diam.

Fls. *Apr.—May.* Fr. *Oct.—Jan.*

Hill and plateaux of Bal. and Bil. ; Hingni range (N. W.) Bh.

This tree again exhibits a series of forms much as in Chota Nagpur. In Baihar and Hingni the form with oblong leaves green beneath occurs, on the Mandla-Bilaspur boundary a beautifully white tomentose form with oblong acuminate leaves. Both these correspond more to G. vestita, *Wall.* At Pachmarhi (outside our area) I collected the form with large ovate leaves; very gibbous at base above and white tomentose beneath, coming very near to G. elastica of Royle, and very similar to a Parasnath form, and to G. elatostemoides, *Coll. et Hems.*

67. Grewia Rothii, *DC.* Gatarni, *Mar.*; Bansuli, *Gondi* (Bil.) ; Bhausuli, *Chh.*

A pretty shrub or, rarely, a small tree with hoary branchlets, ovate-lanceolate or lanceolate acuminate, 3—5-nerved leaves always beautifully white beneath. Stipules broadly linear to linear-subulate equal or exceeding the petiole. Peduncles slender ·5—1″ long with usually 3 very slender pedicels clavate beneath the fl. and linear bracts ⅛″ long. Fr. ¼″ hoary, ultimately purple.

Fls. *Apr.—Sep.* Fr. *June—Oct.*

Frequent in undergrowth in the forests of all divisions.

68. Grewia rotundifolia, *Juss.* Bari gatarni (N. Ch.).

A small usually crooked tree. Bark of old trees cracked dark grey. Blaze deep crimson, with some lighter streaks. L. broadly ovate, broadly elliptic or orbicular, young often sub-equal at base, old usually oblique denticulate, or occasionally coarsely toothed, easily recognised by the persistent tomentum or pubescence which give a grey-green colour beneath. Fls. very numerous, tomentose, on slender peduncles which *considerably exceed the young* ·2—·3″ petioles, and are usually twice as long. Flower-buds large woolly globose or broadly ellipsoid until ripe.

Fls. *Apr.—May.*

Chiefly in the western divisions of N. and S. Ch. (on sandstone) and N. W. (on trap) (almost gregarious near Rampuri, Kondhali range), less abundant eastwards, and not yet recorded from Bal. or Bil.

All the **Triumfettas** have yellow flowers, fascicled in long spikes or racemes and remain open up to mid-day only.

69. Triumfetta pilosa, *Roth.*

A shrub 3—6 ft. high with stellately hairy stems and simple ovate-lanceolate leaves with sub-cordate base softly stellately hairy both sides. Conspicuous in fruit from the heads of hooked spines being ¾—1″ diam.

Fls. *Sep.—Nov.* Fr. *Nov.—Jan.*, but old fruits often persist till *Apr.*

In shady forests. Sonakhan, Pantora, etc. (Bil.); Bal., frequent.

70. Triumfetta rhomboidea, *Jacq.* Anduli, *Mar.*

An undershrub 3—4 ft. with more or less pubescent branches and 3-lobed 5—7-nerved leaves with sub-cordate base stellately hairy, especially on ribs beneath. Fruits with the minutely-hooked spines ¼″ diam.

Fls., fr. most time of the year except the driest.

Chiefly in open forests and open ground, very common in all divisions. Yields a fibre.

71. Triumfetta rotundifolia, *Lam.* Mendurli, *Mar.*

An undershrub 3—4 ft. with sub-orbicular scarcely lobed leaves ·5—1·5″ diam., white beneath. Fruits globose or ellipsoid ¼″ long, with small hooked spines.

Fls., fr. at same seasons as the last.

Open waste ground, very common in the western divisions.

Key to Corchorus.

A.—Capsule stout with 3-fid beak (tip) 6-angled, three angles winged ... ... acutangulus.
B.—Capsule rather slender ribbed, not winged, with entire beak.
  1. Capsule with transverse partitions between seeds. St many.
    L. (some) with two lower teeth prolonged into tails. Capsule smooth ... ... olitorius.
    L. without tails. Capsule rough ... trilocularis.
  2. Capsule without transverse partitions. St. 5–10 ... ... fascicularis

72. Corchorus olitorius, *L.*,

73. C. fascicularis, *Lamk.*,

74. C. acutangulus, *Lamk.*, and

75. C. trilocularis, *L.*, are all common herbs with small yellow flowers and capsular fruits of which the leaves are eaten in the C. P. The first (Jute) is called *Chichura* in Nagpur, where they often occur as weeds of cultivation.

XIII.—LINACEÆ.

Dwarf shrub with showy yellow fls. 1—1·5″	Reinwardtia.
Woody shrub with white or pink fls. ·25″	Erythroxylon.
Sarmentose shrub with circinate tendrils and yellow fls.	Hugonia.

76. Reinwardtia trigyna, *Planch.*

A small shrub 2—4 ft. high with green herbaceous branches and bright chrome-yellow flowers 1—1½″ diam., on numerous small axillary branchlets.

Fls. *Oct.—Feb.*

Usually on shady banks near streams South Sihawa (Raipur); Bilaspur.

77. Hugonia Mystax, *L.*

A sarmentose shrub of which the short branchlets bear opposite circinate tendrils (modified peduncles) below the clusters of leaves. L. 1·5—3″, obovate-elliptic, entire, very reticulate. Fls. 1—1·5″ diam., yellow. Drupe yellow or red ·5″.

Fls. *May—Oct.* Fr. *Nov.—Dec.*

In scrubby forest on sandy soil, Sironcha forest.

78. Erythroxylon monogynum, *Roxb.* Deodari, *Mar.*; Devaderu, *Tel.*; Ali chetu, *Tel.*

A shrub or small tree, the young twigs scaly with persistent stipules. L small oblanceolate to cuneate-obovate 1—1·6″, often clustered or only two at the ends of the branchlets, somewhat resembling those of a Berberis. Petiole ·1—·25″. Fls. 1—2, axillary, and from leaf scars, ·25″ diam. Fruit a small oblong red drupe ·25″ long on axillary peduncles ·2—3″. Stone coriaceous chartaceous 3-celled.

Fls. *June—Oct.* Fr. *July—Dec.*

Common in the Sironcha forests on sandy soils.

Wood hard, dark-brown. Fruits are eaten.

XIV.—MALPIGHIACEÆ.

79 Hiptage Madablota, *Gaert.*

A very large scrambling or climbing shrub with elliptic leaves 4—7″ long and showy white flowers with one yellow petal. Each carpel in fruit has one large central erect wing and two smaller lateral.

Evergreen. Fls. *Feb.—Mar.* and also *Nov.* Fr. *May.*

In ravines Bilaspur, Balaghat, Raipur, North and South Chanda, not common.

80. Aspidopterys cordata, *A. Juss.* Morsut, *H.*

A tomentose climber with sub-orbicular cordate cuspidate leaves 4—8″ diam., white with appressed pubescence beneath, and *lax* panicles of small white flowers. Fruit of 3 oblong samaras ·8″ long. Small oblong stipules ·1″ are often present in this species.

Fls. *Aug.—Sep.* Fr. *Nov.—Dec.*

Especially near nalas. Umrer range (Nag.-Wardha); Nagpur, *Graham;* North Chanda.

XV.—ZYGOPHYLLACEÆ.

81. Balanites Roxburghii, *Planch.* Hingan, *H.;* Ringri, *Tel*

A very thorny grey-green shrub or small tree with alternate coriaceous pinnate leaves with only one pair of leaflets. Yellowish green flowers ·3″ in capitate cymes. Fruit yellowish 1½—2″ long.

Fls. *Mar—May* (also *Nov.*). Fr. *Nov.—Dec.*

Common, chiefly in the western divisions of Nagpur-Wardha and North Chanda, South Chanda. Partial to trap and cotton soil.

XVI.—RUTACEÆ.

A. Ovules 1—2 in each cell—	
I.—Unarmed shrubs—	
Leaves 5—20-foliolate ...	... Murraya.
II.—Armed trees or shrubs—	
Leaves 3-8-foliolate ...	... Limonia.
„ 1-foliolate	... Atalantia.
B. Ovules more than 2 in each cell—	
Leaves 1-foliolate ...	... Citrus.
„ 3-foliolate ...	... Aegle.
„ 5—7-foliolate ...	... Feronia.

82. Murraya exotica, *L.* Pitondi, *Gondi;* Ban Mirchi, *Bhumia.*

A handsome shrub or small tree with pinnate leaves, small dark-green shining leaflets and white fragrant flowers. Mostly in short sub-sessile 3-fld. cymes. Petals ·75″ long.

Fls. *Apr.—July.* Fr. *Dec.—Jan.* Evergreen.

Ravines and cool rocky places, especially in the higher elevations of Lormi (Bilaspur) and Balaghat; also Paraswara forest and Batkari block (Balaghat).

83. **Murraya Koenigii**, *Spreng.*

A shrub occasionally cultivated in gardens. It is only referred to here in consequence of its being reported by Mr. Witt from all divisions of Berar, except Amraoti It extends throughout the comparatively moist zone at the foot of the Himalayas and along the west of the Peninsular, but that it should be wild in the dry Berar forests and not in the rest of the C. P. is peculiar.

84. **Limonia acidissima**, *L.* Padara Kawat, *Mar.*; Morphai torelka, *Tel.*

A small straight tree with pinnate leaves recognisable from the winged rachis, usually 5—7 leaflets and 1—2 axillary thorns. Flowers small pale yellow. Fruits small globose black ½″ diam.

Sub-deciduous at time of flowering.

Fls. *May—June.* Fr. *Nov.—Dec.*

Dhaba forest (South Chanda).

85. **Atalantia monophylla**, *Correa.*

A large shrub or small tree up to 15″ girth with quite smooth brown bark and thorny branches. Twigs pubescent, often with short axillary thorns. L. coriaceous ovate-ell., ell. or ell.-lanceolate 1—3″ by ·5—1·25″, with emarginate tip and rounded base, thinly pubescent beneath and furfuraceous along the midrib above. Sec. n. 7—8 each side with nearly as strong fine intermediate, looped within the margin and very reticulate between. Petiole ·25—·3″. Fls. white in very short axillary or sub-terminal corymbs. Calyx irregularly split. Petals ·25″. Stamens monodelphous. Pedicels ·2—·4″ with minute ovate caducous bract near base. Fruit 1″ diam., 1-seeded.

Fls. *Oct.—Dec.*

Along river-beds, in Sironcha forest, rare.

"Wood yellow, hard close grained"—Gamble, recommended as a substitute for boxwood.

86. **Citrus medica,** *L.*, which includes limes, lemons and citrons.

87. **Citrus Aurantium,** *L.*, the Orange, and

88. **Citrus decumana,** *Willd*, the Pumelo are all largely cultivated, but have not yet been found wild in the Southern Circle though one species, at least, is wild in the Pachmarhi hills.

89. **Feronia Elephantum,** *Correa.* Katbel, *H.*; Vellaga, *Tel.* (South Chanda Working Plan); Kawit, *Mar.*

A thorny tree with dark-green pinnate leaves, opposite small entire leaflets and green and red (anthers red) flowers ⅓″ diam. The fruit is the well-known wood-apple.

Fls. *Mar.—Apr.* Fr. *Nov.—Jan.*

Especially on cotton soil in North Chanda, Nagpur-Wardha and to a less extent in all districts.

90. **Aegle Marmelos,** *Correa.* Bel, *H.*; Mahaka dibur, *Gondi*; Pater, *Tel.* (South Chanda Working Plan). The Bael tree.

A thorny tree with 3-foliolate leaves and greenish-white flowers 1″ diam. in panicles.

Fls. *May—June.* Fr. *May—June* (of following year).

All divisions. Common on metamorphic rocks.

XVII.—SIMARUBACEÆ.

91. Ailanthus excelsa, *Roxb.* Ghoranim; *H.;* Maharukh, *Vern.* (North Chanda Working Plan).

A tree with light coloured bark, stout hoary tomentose branchlets, large pinnate leaves with 10—13 pairs of very coarsely-toothed leaflets, panicles of small flowers and winged fruits.

Fls. *Feb.—Mar.* Fr. *May.*

Found in all divisions especially near villages. Not common in the forests, as its winged seeds apparently require bare ground for germination.

XVIII.—OCHNACEÆ.

92. Ochna Gamblei, *King.* Turmura, *Gondi;* Gurbelia, *Chh.;* Rakhat Rohan, *H.;* Sonari Kukkamori, *Tel.*

A small very pale glaucous tree with sessile sometimes cordately based obtuse leaves and large yellow flowers $\frac{3}{4}$—1″ diam. in corymbs at the ends of the branchlets.

Fls. *Apr.* when nearly leafless.

South Chanda (Dhaba, Ghot, etc.); Raipur (Balod range) on marl.

93. Ochna squarrosa, *Roxb.*

A small glabrous tree with leaves not glaucous, with very numerous fine oblique secondary nerves and finely serrate, is found in Cherla (recently transferred to Madras) according to Mr. Donald.

94. Ochna pumila, *Ham.*

A pretty undershrub with a long stout root-stock from which is sent up annually shoots 8—18′ high, bearing broadly oblanceolate finely serrate leaves 3—6″ long and umbels of large bright yellow flowers 1½″ diam.

Fls. *Apr.—June.*

Common on the Raigarh, Baihar and Bilaspur plateaux.

XIX.—BURSERACEÆ.

A. Flowering before the leaves
  L. lobulate or coarsely crenate. Disc fleshy annualar.
    Fr. capsular ... ... Boswellia.
  L. shallowly crenate. Disc thin lining the calyx tube.
    Fr. drupaceous ... ... Garuga.
B. Flowering with the young leaves.
  L. serrate or sub-entire. Disc small annualar.
    Fr. drupaceous ... ... Bursera.

95. Boswellia serrata, *Roxb.* Salai, *H.*; Anduga, *Tel.* (South Chanda Working Plan).

A tree with the bark pealing off in thin papery flakes, pinnate leaves with opposite coarsely crenate-serrate leaflets and racemes of smallish white flowers, ·5—·6″ diam.

Fls. *Jan.—Mar.* Fr. *Apr.—May.* Deciduous *Jan.—June.*

All divisions, especially common on low hills, scarce in the Sal forests.

Can be easily grown from large cuttings. Wood can be used for charcoal and is sometimes cut for planks. It is the chief wood used for matches at the Kota factory in Bilaspur.

96. Garuga pinnata, *Roxb.* Ghogar, *H.* (South Chanda Working Plan); Gargu, *Gondi* (Balaghat Working Plan); Garga, *Tel.* (South Chanda Working Plan); Kekar, *Gondi;* Kekara, *Mar.;* Kanhayan, *Mar.;* Mohdi, *Baiga;* Gari, *Kamar;* Garirukh, *Chh.*

A tree with pinnate leaves and opposite crenate pubescent leaflets. Yellow companulate flowers in panicles from the ends of the leafless branches. Fruit globose $\frac{3}{4}''$ diam.

Fls *Mar.—Apr.* Fr. *June—Aug.* Leafless *Mar.—May.*

In all divisions, on cool sides of hills and in ravines. Common in Sonawani ravines (Balaghat); common in Sihawa forests Raipur); frequent among hills in Bilaspur · Indapur, along nalas (Nagpur).

97. Bursera serrata, *Colebr.* Lindwi, *Chh.*

A tree with pinnate leaves and opposite entire or more or less serrate oblong leaflets pubescent on the nerves beneath. Very small green flowers in lax panicles from the leaf axils. Fruit globose ·5—·75″·

Fls. *Mar.—Apr.* Fr. *May.*

Rare in the C. P., Dukawa and Ardarha nalas, South Sihawa (Raipur); Achanakma (Bil).

XX.—MELIACEÆ.

A. Ovules 1—2 in each cell. Seeds not winged. St. united into a tube.

I.—Petals spreading. Leaflets toothed.

St. tube oblong. L. pinnate. Tree ... Azadirachta
" " " L. 2—3 pinnate Tree Melia.
" " very short. L. pinnate. Shrub Cipadessa.

II.—Petal erect or sub-erect. Lflts. entire.

Petals 3—5 (planted only) ... Amoora.

B. Ovules many in each cell. Seeds winged.
  I.—St. united into a tube ... ... Soymida.
  II.—St. not united into a tube.
    Perfect stamens 4—6. L. not gland-dotted ... ... Cedrela.
    Perfect stamens 10. L. gland-dotted ... Chloroxylon.

98. Azadirachta indica, *A. Juss.* Nim, *H.*; Sedyapa, *Gondi*; Yapa, *Tel.* (South Chanda Working Plan).

A handsome tree with dark-green pinnate leaves with serrate leaflets. Flowers white, ·3″ diam., in axillary panicles. Drupe yellow oblong ·5—·75″ long.

Fls. *Mar.—May.* Fr. *June—July.* Evergreen.

It is naturalised in several forests, *e.g.*, Karandla Working Circle (Nagpur-Wardha), Minjhari Working Circle (North Chanda), South Chanda near Singampalli, Dighori block, grows well on cotton soil and trap, and has been found a most useful tree in re-stocking the Seminary hill in Nagpur. It grows readily from seed, which germinates at the beginning of the rains.

The oil is much used in parasitic skin diseases.

99. Melia Azedarach, *L.* Bakain, *H.*; Persian Lilac.

A pretty tree with 2-pinnate leaves and panicles of lilac-coloured flowers. Drupes yellow nearly globose.

Fls. *May—June.* Fr. *Nov.—Dec.*

It is more or less leafless from December to April, which discounts its value for ornamental purposes.

Native of Burma, very quick growing.

100. Cipadessa fruticosa, *Blume.*

A small pubescent tree or large shrub with long sub-sarmentose branches, pinnate leaves with 7—11 opposite variously toothed leaflets and axillary or extra-axillary small cymose rather long stalked panicles of small white flowers. Fruit ·2″ diam.

Fls. *Apr.* Fr. *Aug.*

Rare. South Sihawa (Raipur).

101. Soymida febrifuga, *A. Juss.* Rohan, *H.*; Soimi, *Gondi*; Sumi, *Tel.* (South Chanda Working Plan).

Usually a small or moderate sized tree with thick wrinkled branchlets and pinnate leaves 9—18″ long, usually red when young and often with permanent red rachis and midrib of the sessile leaflets. Flowers white or greenish-white, ·3″ diam., in large terminal panicles. Fruits large, woody when ripe.

Fls. with old falling leaves *Feb.—Mar.*, or with new leaves *Apr.* Fr. *May—June.*

Common except in the Sal areas. Grows abundantly on cotton and calcareous soils.

The poles are valued for building.

102. Cedrela Toona, *Roxb.* Tuni, *H.*

A handsome tree 50—60 ft. high and 3—5 ft. girth with imparipinnate leaves 1·5—2 ft. long (shorter leaves occur near the inflorescence) and 10—16 prs. of leaflets which are very obliquely lanceolate acuminate and up to 6″ long. White campanulate flowers about 15″ long with oblong-obtuse ciliate petals, in inclined or drooping panicles. Capsule slightly obovoid-oblong ·7″ long.

Fls. *Mar.—Apr.* Fr. *May—June.* New leaves *Mar.—Apr.*

Dhansua, Baihar and Raigarh ranges in Balaghat, along valleys on the plateau. Lormi forests, Bilaspur, in similar places.

The typical Toona with drooping panicles longer than the leaves, leaves only pubescent in the axils of the sec. n beneath, and pubescent petals only occurs planted. C. de Candolle gives 'Bilaspoor' as a locality. The wild form is not typical C. Toona and is probably C. de Candolle's variety "deccana" But (*a*) Balaghat specimens, (*b*) Lormi specimens, (*c*) Pachmarhi specimens show differences.

(*a*) Fls. 5 mm. long, filaments glabrous, anthers muticous. Branchlets and petioles pubescent when young or with fine ferruginous tomentum. Sec. n. slightly puberulous. Panicles shorter than the leaves, pubescent.

(*b*) Fls. 4 mm. long only. Otherwise as in (*a*)

(*c*) Panicles longer and stouter and all parts more glabrous.

Fls. 5 mm. long, filaments slightly pilose. Anthers often apiculate. Column more elongated. Possibly planted. Form *a*, also occurs in Pachmarhi.

The seedling leaves of all are coarsely *serrate*. The tree thrives best on sandy soils. It has a beautiful red wood as in the typical Toon

103. Chloroxylon swietenia, *DC.* Bhira, *H.*; *Mar.*; Billu, *Tel.* (South Chanda Working Plan); Bilgu, *Gondi*

A small or moderately sized tree with thick corky bark, pretty grey, or glaucous-green pinnate foliage with 10—20 prs. of small gland-dotted leaflets. Fls. white in panicles. Capsule 1—1½".

Fls. *Mar.—Apr.* Fr. *May—June.* Leafless *Feb.—Apr.*

Common in all divisions and attains timber size on sandy loams in Chanda. Much prized as poles. A very useful tree as it will grow on the dry hard sandstone plateaux of Raipur, etc., as well as in cotton soil, and it thrives on heavily grazed ground, owing to the acrid juice making it unpalatable even to goats.

XXI.—OLACACEÆ.

104. Olax scandens, *Roxb.* Dheniani, *H.;* Ardhaphal, *Mar.;* Chit, *Chh.;* Kurpodal, *Gondi;* Harduli (North Chanda Working Plan); Turkavepa, *Tel.*

A usually scrambling or climbing shrub with trunk attaining 1 ft. diam., pubescent branchlets and white flowers in short racemes. Fruit ·3″ diam. yellow, more than half enclosed in the succulent yellow calyx tube.

Fls. *Apr.—June.* Fr. *Oct.—Dec.*

A root parasite (like the Sandal), common in all districts, especially North Chanda.

105. Opilia amentacea, *Roxb.* Dauer Bel, *Mar.;* Nakargand, *Mar.* (f. Donald); Elkanakar, *Gondi;* Turkatopera, *Tel.*

A scandent shrub with fulvous-tomentose branchlets and lanceolate or lanceolate-ovate leaves 1½—4″ long with distinct fine and irregular secondary nerves. Fls. very small, greenish-white slender-pedicelled racemed in threes, concealed when young by orbicular ciliate bracts. Drupes ·3″.

Fls. *Apr.—May.* Fr. *July.*

A root parasite.

Very common in North and South Chanda.

106. Cansjera Rheedii, *Gmel.* Haradphuri, *Mar.;* Kurpodol, *Gondi;* Kokuti, *Maria.*

A large scandent shrub with pubescent green branchlets and shining ovate or lanceolate-ovate leaves 1½—4″ long, minutely translucent dotted with fine indistinct secondary nerves. Fls. very small yellowish sessile tomentose in tomentose spikes ½—1′ long. Bracts minute subulate. Fruit scarlet ellipsoid ·3—5′ sessile.

Fls. *Nov.—Dec.* Fr. *Apr.—May.*

I have no specimens But as it occurs all round the C. P. it probably occurs within it. The vernacular names were applied to a plant supposed to be this in S. Ch. but not in flower nor fruit.

XXII.—CELASTRACEÆ.

107. Euonymus godaverensis, *Haines* (Ind. Forester, XL, 3). Ali Chetu, Nakiragudam Chetu, *Tel.*

A large shrub or small tree with rugose bark and grey and dark crimson blaze. Branchlets 4-angled. L. opposite, lanceolate, ell. or slightly ovate-lanceolate, obtuse or rounded, 1·7—3·25″ long, coriaceous, with margin slightly revolute. Fls. very small greenish in 1—3-fld. cymes at the base of the new shoots.

Evergreen. Fls. *Dec.—Jan.*

In poor open river valleys in South Chanda (Sironcha).

108. Celastrus paniculata, *Willd.* Malkamni *H.;* Rungel (North Chanda Working Plan); Dhimarbel, *Mar.* (f. Donald).

A scrambling or climbing shrub with long lenticellate branches, alternate obovate serrulate leaves, green flowers ⅛″ diam. in terminal panicles and yellow 3-lobed capsules with red-arilled seeds.

Fls. *Apr.—June.* Fr. *Oct.—Jan* Common.

The oil is used for rheumatism and for burning.

109. Gymnosporia montana, *Roxb.* Baikal, *H.;* Bharati, Baikar (North Chanda Working Plan); Dante, *Gondi* (South Chanda Working Plan); Danti, *Tel.* (South Chanda Working Plan).

A large shrub with the branchlets usually ending in thorns which often bear leaves and flowers. L. leathery 1½—2″ elliptic or obovate rounded at apex. Flowers ¼″ white in axillary cymes. Capsules not woody, about ·2″ diam., usually purple when ripe.

Fls. *Oct.—Nov.*

Especially common in the western division (Nagpur-Wardha and North Chanda and South Chanda) on trap and cotton soil.

110. Elæodendron glaucum, *Pers.* Aran, *Mar.;* Jumrassi, *H.;* Bhutanksham, *Tel.* (South Chanda Working Plan).

A small tree with opposite (or alternate on some shoots) dark-green crenate or serrulate leaves 5′ by 2½″ and lateral divaricate corymbose cymes of small flowers with greenish-white petals. Drupes ·5″ long

Nearly evergreen. Fls. *Sep.—Dec.* Fr. ripens about *Feb.*

Common on trap (Nagpur-Wardha and Chanda) and on metamorphic rock

XXIII.—RHAMNACEÆ.

I.—Scandent Shrubs. Unarmed.
  Branchlets occasionally coiled but tendrils O ... ... Ventilago.
  Climbing by tendrils ... ... Helinus.
II.—Armed shrubs, erect or climbing by the recurved stipular thorns rarely (in Z xylopyra) unarmed ... ... Zizyphus.

111. Ventilago maderaspatana, *Gaertn.* Pem, *Gondi ;* Chunuguru, *Tel. ;* Papri, *H.*

A large scandent shrub with green branchlets, bifarious elliptic or oblong leaves 3—6″ long and pubescent fascicles of small yellow-green flowers arranged in interrupted panicles. Fruit produced into a narrow-oblong wing seated upon, or half sunk in, the adnate calyx tube.

Fls. *Sep.—Mar.* Fr. *Mar.* Evergreen.

Yields an oil. Mr. Donald states that var. *calyculata* is the form in South Chanda.

Key to Zizyphus.

I.—Not at all scandent.
  A. Fls. in axillary almost sessile dense cymes.
    1. Petals oblanceolate or obovate-spathulate almost enclosing the stamens.
      Tree. L. over 1″. Drupe over ·5″ Jujuba.
      Shrub. L. over ·75″ Drupe ·3—·5″ Var. fruiticosa.
    2. Petals broadly spathulate with long claw, margins slightly incurved.
      Shrub. L. mostly under ·75″. Drupe 3″ ... ... rotundifolia.
  B. Fls. in axillary peduncled cymes, or panicled.
      Trees. L. over 1″ ... ... xylopyra.
II.—Scandent.
  L. 1—2·5″ Cymes not panicled.
  Fr. black ... ... Œnoplia.
  L. 1·5—3″. Cymes panicled.
  Fr. white ... ... rugosa.

112. Zizyphus jujuba, *Lamk.* Bor, Ber, *H.;* Regi, *Tel.* (S. Ch. W. P.).

A small tree with usually drooping branches, young tomentose. L. 1·5—3″ usually densely brown tomentose beneath rarely tomentum white. Fls. small green in dense axillary tomentose cymes or clusters about ·1″ from centre to tip of sepal. Petals oblanceolate or obovate-spathulate with inflexed margins, hooded over and reflexed with the stamens soon after expansion. Drupes ·5—·75″ diam., globose or ellipsoid.

Fls. *Mar.—July.* Fr. *Jan.—Mar.* New leaves *Mar.—Apr.*

Common. The arboreous form is usually on sites (or possible sites) of old cultivation but it is common in the Zamindari forest in the east of Bhandara.

Var. fruticosa (*Flora of Chota Nagpur*), a much branched shrub 3—4 ft. high with leaves ·75—1·5″ minutely serrulate or with 3 more coarse teeth near the apex. Fruit globose yellow or red shining ·3—·5″ diam.

Common and comes very close to next species. Often fls. *Aug.—Sep.* and fr. *Dec.—Feb.*, but the arboreous form may also extend its flowering and fruiting seasons.

113. Zizyphus rotundifolia, *Lamk.* Syn. Z. nummularia, *W. & A.* Jhar Ber, *Mar.;* Ranber, Lahanber (N. Ch. W. P.).

A small much branched often gregarious shrub with slender divaricate often zigzag branches, pubescent when young. L. ·4—1″ grey tomentose beneath, denticulate or 3-toothed.

Flowers smaller than in last, ·07″ from centre to tip of sepal. Petals very broadly spathulate erect or reflexed, margins not much incurved, claw comparatively longer than in last. Drupes ·3″ diam. globose, reddish when ripe and shining.

Fls. *Oct.—Dec.* (also *Mar.—June, Brandis*). Fr. *Nov.—Feb.*

On open waste lands, often on cotton soils in the western districts. Talodhi (S. Ch.)

[The typical form is tomentose or hairy also on the upper side of the leaves, the C. P. form is glabrous or nearly so. Brandis makes much of the one slender spine and one short-hooked spine, but this also occurs in the last species. Lawson calls the petals of this obovate and those of *Jujuba* sub-spathulate, but to me it appears that the term spathulate is more applicable to the petals of this species. I have never seen this species *brown*-tomentose as is so common in Jujuba.]

114. Zizyphus Œnoplia, *Mill.* Ironi, Yeruni, *Gondi, Mar.;* Makoya, *H., Chh.;* Porki, *Tel.* (South Chanda Working Plan).

A thorny shrub becoming a large climber festooning the highest trees. Trunk armed with conical spine-tipped woody bosses. L. oblique 1—2·5″ with brown silky appressed hairs beneath. Cymes under ·5″ long. Fruit ·25″ black, shining, eaten.

Fls. *June—Sep.* Fr. *Nov.—Dec.*

Common in most districts but especially on the Chanda sandstones where it becomes a terrible pest, producing an impenetrable thicket in many places.

115. Zizyphus xylopyra, *Willd.* Khatbor, Ghoti, *H.;* Ghœnt, *Baiga* (Balaghat Working Plan); Gutul, *Bhumia.*

A small usually crooked tree with spreading crown, with or without thorns, but the young plants are very bushy and very thorny. L. elliptic or ovate 1·5—3′ more or less pubescent beneath, green flowers in peduncled dense cymes axillary, or panicled on lateral branches. Drupe globose 1—1·5″ diam., flesh dry when ripe.

Fls. *Apr.—June.* Fr. *Jan.*

In all districts, very common.

Wood hard and durable.

116. Zizyphus rugosa, *Lamk.* Pitondi, *Chh.*; Katakuli, *Gondi*; Deoghoti, *Vern* (South Chanda); Safed Ironi, *H.* (Donald).

A large shrub with long pendent or scandent branches, large elliptic serrulate leaves 3—6″ long. Flowers ¼″ greenish-yellow in large panicles. Fruit ·3—·5″ white fleshy, edible.

Fls. *Feb.—Mar.* Fr. *May—July.*

Balaghat, on the plateaux and ghats, common; South Sihawa (Raipur,) common; South Chanda, frequent; Bhandara; Raj Nandgaon; less common in other districts.

117. Helinus lanceolatus, *Brandis.*

A bright green slender shrub climbing by means of tendrils (modified branches) with ovate or lanceolate entire leaves about 2½″ long and small yellow flowers in slender peduncled, often panicled, cymes. Fruit ½′ diam., the putamen finally separating into 3 crustaceous pyrenes.

Fls. *Jan.—Apr.* Fr. *Apr.—May.*

Common on Baihar ghats and on the plateau (Balaghat); Lormi forests (Bilaspur) on rocky ground.

XXIV.—AMPELIDACEÆ.

Climbing herbs or shrubs with tendrils ... Vitis.
Erect stout herbs or shrubs without tendrils Leea.

Key to Vitis.

A. Leaves simple. Fl 4-merous.
  1. Stem succulent 4-winged ... quadrangularis
  2. Stem not winged.
    Rather succulent and herbaceous L. 2—6″. Tendrils simple . . Linnæi.
    Stems perennial, old woody, L. 4—15′. Tendrils forked repanda.
B. Leaves simple Fl. 5-merous.
  Glabrous, often glaucous. L. 4—8′ latifolia.
  Densely tomentose L. 5—10′ . tomentosa.
C. Leaves 3-foliolate, stems succulent.
  Leaves petioled Lflts crenate ... trifolia.
  Leaves sessile Lflts serrate-dentate ... . setosa.
D. Leaves 5-foliolate . . .. auriculata.

118. Vitis quadrangularis, *Wall.*

Donald states that this is found near Ahiri and used as a vegetable. The stems are fleshy, contracted at the nodes and 4-winged.

119. Vitis repanda, *W. & A.* Gonvehli, *Gondi*; Gendal, *Nag* (f. Graham); Dokarbela, *Chh.*; Godina tige, *Tel.*

A large climber with soft stem and corky bark, large simple deeply cordate usually repand or denticulate leaves (young often with large sharp teeth) and slender peduncled tomentose cymes of small flowers. Young parts all densely tomentose, glabrescent.

Frequent in all divisions.

Fls. *May—June* on the new shoots, or *July—Aug.* (Graham). Deciduous.

The stem yields a quantity of drinkable water.

Neither Hole nor Witt mention this species, but they give the name Dokarbela to V. latifolia to which it is also sometimes applied. It occurs in the Northern Circle, as I have seen it below Pachmarhi.

120. Vitis Linnæi, *Wall.* Jangli Angur, *H.* (Angur is the Grape Vine).

A weak climber with corky bark, very membranous leaves 2—6″ diam. which are shallowly lobed and coarsely toothed, basal sinus wide and shallow or base nearly truncate, clothed with a short curly pubescence beneath. Flowers minute with very caducous petals. Fruit pale-purple 1-seeded on deflexed pedicels.

Fls. *r. s.* Fr. *Oct.—Nov.*

Nagpur-Wardha, common. South Chanda.
Probably in other divisions, but it dies down in the cold weather.

121. Vitis latifolia, *Roxb.*

An extensive, scarcely woody climber glabrous (or nearly so) everywhere except the rachis of the inflorescence with simple 3—7-angled or lobed leaves 4—8″ long and broad, deep brown-red flowers and black succulent berries.

The lower leaves are often 3-lobed nearly to the middle.

Common. Fls. *June—Aug.* Fr. *Sep.—Oct.* Dies down in the hot weather.

Berry eaten.

122. Vitis tomentosa, *Heyne.* Pur bel, *Mar.*

Similar to last, but always with leaves densely tomentose beneath and other parts also more or less tomentose, leaves all deeply 3—5-lobed, often attaining 10″ both ways. Flowers red in divaricate cymes on a peduncle under 1″ long, which is carried on a leafless shoot 3—6″ long, ending in a forked tendril.

Fls. *July—Sep.* Fr. *Oct.—Jan.*

Nag.-War.; South Chanda. Probably in all divisions as it is common in western Bengal.

123. **Vitis trifolia**, *L.*

A weak sub-succulent climber, pubescent when young with 3-foliolate petioled leaves, crenate leaflets and small greenish flowers in lax divaricate long-peduncled cymes.

Common. Fls. *June—Aug.* Fr. *Oct.—Jan.*

124. **Vitis setosa**, *Wall.* Tiphankhand, *Vern.* (Graham).

A week succulent climber, covered with glandular bristly hairs with 3-foliolate sessile leaves, and serrate-dentate leaflets.

Fls. *July—Aug.*

Nagpur-Wardha, common.

Leaves used to dress wounds on oxen.—(Graham.)

125. **Vitis auriculata**, *Roxb.*

A large sub-succulent scrambler with digitate 5-foliolate leaves long-petioluled crenate-serrate leaflets and large divaricating cymes. Fruit ·5—·75″ diam., reddish when ripe.

Fls. *r. s.* Fr. *Oct.—Dec.*

North Chanda (?). There are no specimens.

126. Leea macrophylla, *Roxb.*

A robust herb 2—3 ft. from a perennial rootstock with few simple (at least the lowest) ovate-cordate leaves, of which the largest may be 1—2 ft. diam. Small white flowers in sessile corymbs.

Fls. *June—July.* Common, but only evident in the rains.

127. Leea aspera, *Edgw.* Hasia daba, *H.*

Shrubby with stems 5—10 ft. which die down annually, lower leaves 2-pinnate, upper pinnate. Leaflets elliptic or ovate with strong secondary nerves which bifurcate near the margin and give a branch to each pair of teeth, usually with scattered short rigid hairs and dotted between the nerves above. Corymbs peduncled. Berries slaty-green, finally black.

Fls. *July—Sep.* Fr. *Nov.—Dec.*

Nag.-War.; Chanda, common.

Root used as a tonic.

128. Leea robusta, *Roxb.* Dara chettu, *Tel.*

A large sub-woody shrub 4—6 ft. with more or less pubescent or tomentose branchlets, large 2—3-pinnate leaves with leaflets attaining 12″ pubescent or sparsely strigose beneath and large branched, usually geminate corymbs 7—15″ diam.

The secondary nerves are 6—13 prs. above the 5—7-nerved base*of the leaflets. Fls. r. s. Berry ·3—·35″ diam., depressed.

Fls., fr. *c. s.*

Bhandara; South Chanda. Probably elsewhere.

129. Leea sambucina, *Willd.*

A woody shrub with large 2-pinnate leaves glabrous beneath and very large coarsely doubly-serrate leaflets up to 12″ by 3½″. Secondary nerves 7—15 prs. much raised beneath, curved within the margin. Teeth 3—5 times as many as the secondary nerves. Flowers green in subsessile corymbs 3—6″ diam

Fls. *June—Aug.* Fr. *Sep.*

Bilaspur.

XXV.—SAPINDACEÆ.

Key to Sapindaceæ.

A. Trees.
  Stamens inserted inside the disc.
  L. pinnate.
  Petals O. Fruit ovoid-apiculate ... Schleichera.
  Petals 4—5 Fruit 1-3-lobed ... Sapindus.
B. Shrubs.
  St. inserted inside the disc. L. 1—3-foliolate ... ... Allophyllus
  St. inserted outside the disc. L. simple Dodonæa.

130. Schleichera trijuga, *Willd.* Kusum, *H.;* Puski, *Tel.*

A handsome dense-foliaged tree with pari-pinnate leaves and 2—4 prs. of opposite entire leaflets 3—10″ long, the basal ones smallest. Flowers inconspicuous, greenish-yellow in numerous lateral racemes appearing with the new, often deep-red, foliage. Racemes in the male often branched or panicled. Fruit ovoid. 1—1½″ coriaceous.

Fls. *Feb.—Apr.* Fr. *June—Aug.*

In all divisions, but especially in Raipur. Not common in Nagpur-Wardha.

The timber is good. The aril and kernal of the seeds are eaten. An oil is expressed from the seeds.

131. Dodonæa viscosa, *L.* Mehndi, *H.;* Kharata, *Mar.;* Lahan Lokhandi, *Mar.* (f. Donald); Paliwaili, *Tel.*

A light green resinous shrub attaining 10 ft. high with simple oblanceolate glabrous subsessile leaves 1—3·5 long and short cymes of green flowers. Fruit membranous 2—4-winged.

Fls. *Nov.—Feb.* Fr. *Oct.—Nov.*

The distribution is peculiar, but, generally speaking, it avoids trap and favours sandstone. In the Sonawani range (Balaghat) it is found on ridges of white clay schist, but is local. In Chanda it is very common and is also found there on kunker soils. In Raipur it is rare, and has not yet been noted in Nagpur-Wardha, Bhandara or Bilaspur. It re-appears on the sandstones of the Pachmarhi hills (Northern Circle).

132. Sapindus laurifolius, *Vahl.* Ritha, *Mar.;* Kukur, Kunkuda, *Tel.* The Soap-nut.

A large tree with even-pinnate leaves and three pairs of opposite leaflets, pubescent beneath. Fr. 3-lobed, fleshy.

Near villages, occasional. South Chanda (Donald).

133. Allophyllus Cobbe, *Blume.* Morwel, *Mar.;* Namilikalu, *Tel.*

"A scrambling scrub with trifoliate pubescent serrate leaves and large slender spicate inflorescence of minute flowers. Found in Cherla."—*Donald.*

XXVI.—ANACARDIACEÆ.

Key to Anacardiaceæ.

A Leaves simple. Fls. with the leaves.
  1. Fls greenish or white.
    St. 1—5. Style lateral. Receptacle not enlarged ... ... Mangifera.
    St. 5. Styles 3. Drupe oblong on a swollen receptacle ... ... Semecarpus.
    St. 10. Carpels 5 distinct. Drupe small round ... ... Buchanania.
  2. Fls. pink. Fruit kidney-shaped ... Anacardium.
B. Leaves pinnate. Trees flowering before leafing.
    Not aromatic. Fls. in slender racemes Odina.
    Aromatic. Fls. in pyramidal panicles Spondias.

134. Mangifera indica, *L.* Am, *H.*; Amba, *Mar.*; Marka marra, *Gondi*; Mamidi, *Tel.*

Fls. *Feb.—Mar.* Fr. *May—June.*

A large tree up to 7 ft. girth or more, occurring in ravines especially those with a continuous water-supply. It occurs in all districts and is undoubtedly indigenous in localities indicated, especially in Bal., Bil., Rai. and Ch.

It ascends to the top of the Kaman Ghat in the Diri-Mangli forest (Bal.).

135. Anacardium occidentale, *L.* Kaju, *Mar.* The Cashew Nut.

With alt. simple entire leaves and terminal panicles of pink flowers is not unfrequent in gardens. The kidney-shaped 'nut' is borne on a large pear-shaped receptacle.

136. Buchanania latifolia, *Roxb.* Char, Achar, *H.*, *Mar.*; Chironji (the fruit); Herka marra, *Gondi* (f. Donald); Sarekha, *Gondi*; Morli, *Tel.*

A straight, small tree common in all divisions. Bark mostly dark-grey, rough with square bosses.

L. oblong or ovate-oblong, mostly 6" by 3". Fls. small in terminal branched pyramidal panicles. Fr. black globose.

Fls. *Jan.—Feb.* Fr. *Apr.—May.*

137. Buchanania angustifolia, *Roxb.* Markaria char, Mota char, *Mar.;* Tolmori, peimota, Muri chetu, *Tel.*

A tree somewhat resembling the last with smaller, narrower, stiffly spreading obtuse leaves 2—3" long, pale beneath and glabrous all over. Panicles smaller of many sub-racemose branches, some of which are axillary. Fruit usually oblique and ·4—·6' diam.

Fls. *June—July* Fr. *Dec.—Jan.* Some fruits remain until *Apr.*

Open forest, South Chanda, on marl. 'Wood used for making spoons'—(Donald).

138. Odina Wodier, *Roxb.* Moyal, Mohi, Mohwai, *Mar.;* Gupri marra, *Gondi;* Dumpidi, *Tel.*

Usually a small tree in the C. P., except in the hills. Bark light-coloured smooth in young trees, rough and brown or cinereous in old. On shady slopes attains 6 ft. Blaze bright crimson, streaked or flushed pale pink or white. L. odd pinnate with 5—9 entire leaflets, early, deciduous. Fls. (when leafless), clustered on numerous terminal spiciform racemes, greenish. Male racemes pendulous and compound, female sub-erect. Fr. of small red compressed drupes.

The C. P. variety has more or less pubescent leaves.

Fls. *Mar.—Apr.* Fr. *May—June.*

In all districts The wood is good, but the tree is not much used as a pole. The branches are cut for elephant fodder.

139. Semecarpus anacardium, *L.f.* Bhailawa, *H.;* Biba, Bibe, *Mar.;* Kokha marra, *Gondi;* Jiri, *Tel.* The Marking Nut.

A usually small crooked or m. s. tree with deep red, rather thick blaze and very large simple oblong or obovate-oblong leaves 8—18″ long. Fls. small dull greenish-yellow ·25″ diam. in panicles. Fr. an oblong or obliquely ovoid drupe, black when ripe seated on a fleshy orange cup.

Fls. *June—Sep.* Fr. *Dec.—Mar.*

In all divisions but not very common.

The fruits are sold. They are used as an ingredient in the 'Chob' for elephants' feet.

140. Spondias mangifera, *Willd.* Amra, *H.;* Amera, *Chh.* Hog-plum.

A moderate sized or large glabrous tree with smooth very thick white soft bark, stout branchlets, and odd pinnate sweet-smelling leaves with 9—12 leaflets. Blaze pink or light red with narrow zones of lighter pink. Fls. white ·25—·75″ diam. in large terminal panicles on the bare branches, succeeded by large yellow plum-like drupes 1·25″ long.

Fls. *Feb.—Mar.* Fr. *Jan.*

Nag.-Wardha (perhaps only planted); Bil.

Not much used. The fruits are eaten by animals and are occasionally palatable when quite ripe.

XXVII.—MORINGACEÆ.

141. Moringa pterygosperma, *Gaertn.* Shewaja, *Mar.;* Soajma (N. Ch. W. P.). Drumstick or Horse-radish tree.

A small tree with elegant tripinnate leaves and very small leaflets, white irregular flowers in axillary panicles and pendulous ribbed pods 9—18″ long.

Fls. *Jan.—Mar.* Fr. *Apr.—June.*

Often cultivated. Used as a vegetable.

XXVIII.—LEGUMINOSÆ.

A.—PAPILIONACEÆ.

Flowers irregular with two lower petals connate forming the *keel*, a usually broad upper petal (*standard*) and two lateral petals *wings.* L. simple 3-foliolate or pinnate. St. 10 or 9 variously united.

Key to Papilionaceæ.

A. L. simple or digitately 3-foliate. Pod dehiscent, turgid not septate.

. Herbs or shrubs. St. monadelphous ... ... Crotalaria, p. 60.

Shrubs or undershrubs, with minute red glands. St. 2-adelphous ... ... Flemingia, p. 73.

B. L pinnately 3-foliolate glandular beneath. St. 2-adelphous.

1. Pod 1-seeded enclosed in the large *sub-papery* calyx Climber... Cylista, p. 72.

2. Pod turgid 1—2-seeded.

Calyx not much enlarged, herbaceous ... ... Rhynchosia, p. 73.

3. Pod compressed with depressed lines between the seeds 2–6-seeded.
Twiners. Seed with large strophiole ... ... Atylosia, p. 72.
Erect, cultivated. Seed without strophiole ... ... Cajanus p. 72.

C. L. pinnately 3-foliolate *not* glandular beneath. Pod dehiscent throughout, rarely with depressed lines (Pueraria), or septate (Termanus, some Glycine, Phaseolus, and Vigna) never jointed. See also Indigofera.

I.--Style not bearded. All climbers exc. Erythrina and some Glycine.

(*a*) Nodes of inflorescence not tumid.
Slender climber. Petals little exerted.
St. 1-adelphous ... ... Teramnus.
Sub-erect. St. 1–2-adelphous. Cultivated ... ... Glycine, p 72.

(*b*) Nodes of inflorescence tumid. Fls. large or showy.
Petals sub-equal. Wings free Canavalia, p. 71.
Petals sub-equal. Wings adnate to keel ... ... Pueraria, p. 70.
Petals very unequal. Climbers ... ... Mucuna, p. 68.
Petals very unequal. Prickly trees ... ... Erythrina, p. 68.

II.--Style bearded below the stigma. Climbers or weakly-erect.

Keel and included style spiral. Pod septate in some species ... Phaseolus, p. 72.
Keel and style not or somewhat spiral. Pod septate ... Vigna, p 71.
Keel not spiral. Pod not at all septate ... ... Dolichos, pp. 71 and 72.

D. L. pinnately 3-foliolate, *not* glandular beneath.

Pod thin, seedless and indehiscent below, above with a single apical seed Ovary only 2-ovuled.
Trees or climbers. Fls showy scarlet ... ... Butea, p. 69.
Woody climber. Fls. small whitish ... ... Spatholobus, p. 69.

E. L. pinnately 4-more-foliolate with opposite leaflets and rachis ending in a point or tendril. St 2-adelphous or the 10th absent. Pod dehiscent, not septate nor jointed. Slender climbers (exc. Lens).

I.—Staminal sheath oblique at mouth. Ovules 2 (*Cultivated. The Lentil*) ... Lens.

II.—Staminal sheath truncate—

(*a*) Stamens 9 ... ... Abrus, p. 67.

(*b*) Stamens 9+1. Cultivated plants (not in list).

Style dilated above ... ... Lathyrus.

Style laterally compressed with reflexed margins ... ... Pisum.

F. L. pinnately 5-more-foliolate with terminal leaflet. Pod flat indehiscent.

I.—Trees.

Fls. pink or white. *Lflts.* opp. Pod almost woody, wingless ... Pongamia, p. 80.

Fls. yellow. Lflts. alt. Pod thin orbicular ... ... Pterocarpus, p. 79.

Fls variously coloured. *Lflts.* alt. Pod thin oblong ... Dalbergia, p. 77.

II.—Woody climbers.

Lflts. alt. Pod thin oblong ... Dalbergia, p. 77.

Lflts. opp. Pod firm oblong, *slightly winged or keeled* ... *Derris*, p. 80.

Pod hard, almost woody, not winged ... ... Millettia, p. 63.

G. L. pinnately 5-more-foliolate (or fewer in Indigofera sp.) with terminal leaflet (exc. Sesbania). Lflts. usually opposite. Pod dehiscent, not jointed but often septate. St. 9+1.

I.—Climbers.

Slender climber. Fls. large showy (*Mussel-shell creeper*) ... *Clitoria*.

Woody climbers. Fls. m.s. ... Millettia, p. 63.

II.—Erect or sub-erect.

Small cultivated herb with toothed leaflets (*Gram, cultivated*) ... Cicer.

Herbs or undershrubs. Anthers apiculate. Hairs usually 2-forked (laterally fixed) ... ... Indigofera, p. 92.

Undershrub. Anthers obtuse.
Hairs basi-fixed ... ... Tephrosia, p. 62.
Tall sub-herbaceous, or arboreous.
L. even-pinnate with very numerous leaflets. Pods septate Sesbania, p. 63

H. L. 1—3-foliolate or pinnate. Pod breaking up into 1-seeded joints and usually indented between the joints (in Desmodium gyrans,* the joints do not separate).

I.—Herbs, shrubs or undershrubs.
L. pinnately 1—3-foliolate.
Pod flat, not coiled ... Desmodium, p. 66.
L. pinnately 1—3 or 9-foliolate. Pod coiled up ... Uraria, p. 65.
L. pinnate with numerous leaflets. Pod straight ... Æschynomene, p. 64.
II.—Trees. L. pinnately 3-foliolate... Ougeinia, p. 65.

142. Crotalaria juncea, *L.* San, *H.*

A strict shrub 4—6 ft. high with virgate grooved stems and branches and narrow linear or linear-oblong leaves 2—4·5″ long which are thinly hairy. Fls, 1″ long yellow racemed. Calyx ·5—·7″ deeply 5-fid densely ferruginous hairy. Pod 1—1·4″ persistently tomentose.

Fls. *r. s*—*Jan.* Fr. *Dec.*—*Feb.*

This is apparently indigenous and is found in most divisions remote from cultivation (*e.g.*, Allapalli forest).

Cultivated for its fibre

143. Crotalaria sericea, *Retz.*

A handsome suffruticose herb with leaves 3—6″ long, paniculate racemes of bright yellow flowers 1″ diam. and glabrous pods 1·5″ long. The stipules and bracts are foliaceous.

Fls. *Sep.*—*Feb.* Fr. *Dec.*—*May.*

Frequent near nalas, all divisions.

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*D. gyrans, the Telegraph plant, is a common herbaceous species not shown in the list.

144. Crotalaria retusa, *L.*

A much branched undershrub 3—4 ft. much resembling C. sericea but with small subulate bracts and stipules.

Fls., fr. *Sep.—Jan.*

Frequent towards Sironcha, S. Ch., Nagpur.

145. Crotalaria ramosissima, *Roxb.* Harduli, *Gondi.*

A densely branched small shrub 1·5—2 ft. high and as broad densely silky all over with small linear leaves ·5—1″ long and yellow flowers tinged with red in numerous few-flowered racemes.

Fls. *Oct.—Dec.*

Especially common on the hills in North Chanda on quartzite rocks. The plant is a pest from the peculiar viscid secretion of the calyx which gives a brown dye.

A number of other less shrubby species of Crotalaria occur, *e.g.*—

146. C. albida, *Heyne*, with oblanceolate leaves 2—3″ white silky beneath, and flowers in terminal racemes, common.

147. C. linifolia, *L.f.*, somewhat similar but with black globose pods and easily recognised by the corolla drying black.

148. C. hirsuta, *Willd.*, with broadly elliptic soft leaves and leaf opposed racemes.

149. C. mysorensis, *Roth.*, with linear leaves and large hirsute calyx.

150. C. orixensis, *Rottl.*, with trifoliolate leaves, elliptic or obovate leaflets and long racemes with small ovate bracts and flowers on slender pedicels.

151. C. medicaginea, *Lamk.*, with small trifoliate leaves, dense, racemes conspicuous by the sharp back of the keel petals and globose pods.

152. Indigofera arborea, *Roxb.* (Syn. I. pulchella of F. B. I.). Sakena, *H.*; Ramtur, baroli, *Mar.*; Jirula baji, Pittiporka, *Gondi*; Randiporka, *Tel.*

A much branched shrub 4—8 ft high with odd pinnate leaves, 6—8 prs. of leaflets ·75—1″ long and racemes of bright pink (rarely white) flowers.

Fls. *Nov.—Feb.* Fr. *Feb.—Apr.*

Common. All divisions, chiefly on metamorphic rock.

The leaflets of a specimen collected at Panchara (Bal.) are 1·7 by ·8″.

153. Indigofera paucifolia, *Delile.*

A small shrub up to 4 ft., with numerous woody branches, pinnate leaves with 3—5 (rarely 1) oblanceolate-oblong leaflets ·5—1″ long and small red flowers in racemes. Pod ·5—·75″ torulose.

Fls., fr. *c. s.*

S. Ch., common near Wamanpalli on cotton soil.

154. Tephrosia pupurea, *Pers.* Unhali Inhai, Davali, *Vern.*

A woody undershrub 1·5—3 ft. high, with pinnate leaves, often gregarious in open ground and frequently referred to as 'Wild Indigo.' Pods about 1·5′ by ·15″.

Fls. purple or white, *July—Jan.*

155. Millettia racemosa, *Benth.* Junji nar, *Chh., Gondi;* Ardhaga, *Kamar.*

A large climbing shrub with odd-pinnate nearly glabrous leaves with 11—15 leaflets pale beneath. Fls. ·5″ in panicled racemes. Pods black 4—8″ long by ·3—·6″ broad torulose with 2—4 tapering segments, readily dehiscent.

Fls. *Apr.—May.* Fr. *Nov.—Mar.*

Shihawa forests (Rai.), common; Sonakhan range (Bil.), common; Raigarh range (Bal.); Allapalli range, Sironcha range (S. Ch.).

156. Millettia auriculata, *Baker.* Aghir, *Kamar;* Patani, *Chh.;* Gaj, *H.;* Gurar, *Bhumia,* Nasbel (Bal.); Nestanda, *Maria;* Nasar Tige, *Tel.*

A large climbing shrub, or sometimes sub-erect in undergrowth, with odd-pinnate leaves and 7—9 strongly-nerved leaflets silky beneath. Fls. in numerous axillary racemes 4—9″ long. Pod flat, sometimes tomentose, 4—6″ tardily dehiscent.

Fls. *Apr.—June.* Fr. *Jan.—Mar.*

All divisions, Rai.; Bhan.; Bal.; S. Ch.
Root used for killing fish.

157. Sesbania grandiflora, *Pers.* Heti, *Mar.;* Agati, *H.*

A small tree attaining nearly 2 ft. with even-pinnate leaves, large white (or sometimes red), lipped flowers 3—4″ long and long slender curved pods.

Fls. *c. s.* Fr. *h. s.*

Cultivated. Very quick growing but only lives 3 to 5 years and is useful as a nurse to other trees. It develops large root tubercles.

158. Sesbania ægyptiaca, *Poir.* Jaita, *H.*

A shrub or small tree with even-pinnate leaves and small yellow, purple, often spotted, or red flowers ·5—·75″ long in lax racemes. Pod thin torulose.

Also very short-lived. Cultivated. Naturalized in S. Ch. (Donald).

159. Sesbania aculeata, *Poir.* Jaita, *H.;* Sauer, Shevra, *Mar.;* Ran, Savri, *Vern.* (f. Graham); Dhan-dhani, *Chh.*

An annual shrub attaining 7—10 ft. during the rainy season and dying in the cold weather. Branches and leaf-rachises muricate. Flowers ·5″ pale yellow spotted, in lax racemes. Pod very slender.

Fls. *r. s.* Fr. *c. s.* A common weed.

The *Sesbanias* are copiously furnished with large root tubercles and form a good green manure. The first leaf above the cotyledons is simple.

160. Æschynomene aspera, *L.*

A stout erect soft-wooded shrub with numerous sensitive odd-pinnate small linear leaflets. Fls. ·75″ long, hispid. Pod jointed, about 2″ long, usually hispid or muricate on the faces.

Fls. *July.* Fr. *r. s.*

In tanks, but not common.

The stems are full of pith (Shola) which is used in Bengal for Sun-hats, and in the C. P. by the Dimars who tie bundles together and use them for rafts ('Ghoia ').

161. Uraria picta, *Desv.*

An undershrub 3—4 ft. with 5—7-foliolate leaves with narrow leaflets 3—6" long usually marked with a yellowish cloud. Fls. small in dense racemes on long bristly pedicels, sepals plumose.

Very common in grassy places and jungles.

Fls. *r. s.* Fr. *c. s.*

162. Uraria hamosa, *Wall.*

An undershrub 3—4 ft. with the habit of Desmodium with lower leaves simple, broadly elliptic, and upper trifoliolate with large terminal leaflet broadly elliptic rounded. Racemes rather lax. Common. In similar places to the last.

Fls. *r. s.* Fr. *c. s.*

163. Uraria lagopus, *DC.*, has mostly 3-foliolate leaves with large oblong leaflets (end one 2—4" by 1·5—2") and long dense cylindrical racemes looking brush-like from the crinate pedicels. S. Chanda.

The pod in this genus, of which there are other less common species, is twisted up so that the joints are brought face to face.

164. Ougeinia dalbergioides, *Benth.* Tiwas, *Mar.;* Tinsa, *H.;* Sar, *Gondi;* Darji, *Tel.*

Usually a small tree, but attains 4—5 ft. girth in favourable localities. Blaze finely closely streaked with blood-red on a white ground. A red juice exudes from the cut. Pinnately 3-foliolate leaves and copious small whitish or pink flowers in fascicled racemes appearing before the new leaves. Pod linear oblong 2—5-jointed.

Fls. *Feb.—Apr.* Fr. *May—June.*

In all divisions and in some places very abundant, but is much cut out by the villagers.

One of the most valuable woods in the C. P. Red clayey loams appear to suit it best. Some of the straightest trees are, perhaps, those in the Sonawani forest and N. Sihawa, and good trees occur in the Zamindari forests between Bhandara and Drug.

165. Desmodium pulchellum, *Benth.* Chipate, *Mar.* (f. Donald).

A shrub 3—5 ft. high with grey-hairy branches. Easily recognised by the inflorescence which far exceeds the leaves and bears double rows of 2-foliolate coriaceous bracts in the axils of which are the fascicles of very small yellow flowers.

Fls. *r. s.* Fr. *Nov.—Dec.* New leaves in *May.* In the damper forests.

Bhan.; Khairagarh; Bal.; Ch.

166. Desmodium Cephalotes, *Wall.*

A shrub 3—6 ft. with much the habit of the last but bracts minute and deciduous. Branches 3-cornered shaggy. Flowers numerous yellow in dense axillary short peduncled umbels often running into leafless racemes.

Fls. *Aug.—Oct.* Fr. *Dec.—Jany.*

167. Desmodium polycarpum, *DC.*

A shrub usually 2—4 ft. usually with numerous erect stems, hairy branches, trifoliate leaves with obovate or elliptic-obovate leaflets and purple flowers ·25″ in dense axillary and terminal often panicled racemes. Pod brown hairy ·5—·7″ jointed, joints dehiscent.

Fls. *Sep.—Oct.* Fr. *Nov.—Jan.*

In shady places. Bhan.; Rai.; S. Ch.; N. Ch.

(A form collected at Pachmarhi has densely shaggy branches.)

168. Desmodium latifolium, *DC.*

Erect shrub 3—6 ft. high, with densely brown-pubescent branches, sub-coriaceous broad-ovate leaves 3—6″ by 1·5—3·5″ and purple flowers ·17—·2″ in numerous often panicled spiciform racemes 2—7″ long.

Fls. *Aug.—Sep.* Fr. *Oct.—Jan.*

Shady places. Khairagarh; N. Ch.; Bhan.

Several other more herbaceous species occur. The pods of all species of Desmodium are jointed but not twisted up.

169. Abrus precatorius, *L.* Kunch, *H.;* Gunj, *Mar.;* Jaistband (the root bark).

A pretty twining shrub with even-pinnate leaves 2—3·5″ long, leaflets ·5—·6″ long and small reddish flowers ·5″ in crowded racemes. Seeds polished round, scarlet or white, with black eye.

Fls. *Sep.—Oct.* Fr. *Nov.—Dec.* Deciduous. Hedges, etc.

N. Ch.; Nag. Probably in all divisions.

The root bark is collected and used for making a drink and a tonic.

170. Mucuna pruriens, *DC.* Kawitch, *H.;* Kanchkuri or Khajkuhiri, *Mar.*

An annual twiner with 3-foliolate leaves and stipellate leaflets 3—5″ long and elongate racemes 6—12″ of purple flowers 1·25—1·5″ long. Pod 2—3″ densely clothed with brown or grey intensely irritating bristles.

Fls. *Sep.—Nov.* Fr. *Jan.—Feb.*

All divisions, in open jungles.

171. Mucuna imbricata, *DC.*

A large climber with slender sparsely-hairy branches 3-foliolate leaves shortly yellow-hairy beneath, dull purple flowers in pendulous few-flowered lax racemes and pods 5″ by 2″, easily recognised by the two narrow wings on each suture and the obliquely plaited face of the pods.

Fls. *r. s.* Fr. *Dec.—May.*

Wet ravines. Lormi forests (Bil.).

172. Erythrina indica, *Lamk.* Pangara, *Vern.*

Occurs on the edges of the fields according to Graham. In leaf it may be distinguished from the next by the absence of the tomentum, and in flower by the much longer racemes and spathaceous calyx. Deciduous.

173. Erythrina suberosa, *Roxb.* Panjra, *Mar.;* Harwa, *Gondi;* Pharid, Parad, *Chh.;* Munimotka, *Tel.;* Gunji, N. Ch. W. P.

A small very prickly tree with pale corky bark, light and dark yellow blaze, 3-foliolate leaves covered with bright brown tomentum beneath and scarlet flowers in capitate racemes only 1·5—3″ long (excluding peduncle). Calyx 2-lipped.

Fls. *Mar.—May.* Fr. *r. s.* Deciduous up to *June.*

Hills. Frequent, Bhan.; Rai.; N.; Ch. N. W. (on sandstone and conglomerate, Kotwalbadi block).

174. Spathalobus Roxburghii, *Benth.* Nasbel, *H.* (f. Donald); Gumhori, *Tel.*; Daura Tige, *Maria.*

Large shrub, climbing from right to left, trunk attaining 2—3 ft. girth. Leaves 3-foliolate. Leaflets 4—9″ by 3—6·5″ strongly nerved minutely silky beneath (but see variety). Fls. cream coloured ·31″ long and 2—3 together in dense racemes. Pods 3—4″ brown velvety with single apical seed.

Fls. *Aug.—Jan.* Fr. *Dec.—Apr.*

Ghot range, Elchil, Dhaba (S. Ch.), N. Ch., Singpur range.

Var. denudatus, *L.* Ultimately glabrous.

This occurs in South Chanda.

175. Butea superba, *Roxb.* Samut, Bodla, *Gondi.*; Tel palas, Balia palas, Bachia, *Mar.*; Motum, *Maria*; Motku tige, *Tel.*; Budhua, *Baiga.*

Large climbing shrub, climbing from left to right with trunk attaining 2—3 ft. girth. L. 3-foliolate. Leaflets. 12—18″ strongly nerved, subrugose and dull above, nervules raised and pubescent. Branches crowded when leafless with gorgeous orange-scarlet flowers 2—2·5″ long.

Fls. *Mar.—Apr.* Fr. *June—July.*

All divisions, especially on ghats, common.

176. Butea frondosa, *Roxb.* Palas, *H.;* Chheola, *Bhan.;* Tessu (the flowers); Murru, *Gondi;* Motku, *Tel.;* Palsa, Cheula, *Bhumia.*

A well-known small tree with black nodose branchlets on which scarlet flowers 2″ long are produced in great profusion. Pods 4—7″ with a single apical seed. Trees with 1-foliolate leaves occasionally occur.

Fls. *Feb.—Apr.* Fr. *May—June.*

Very common in all districts, especially on cotton soil in the plains. Palsi lac is chiefly cultivated in Bhan., and to a less extent in Bal. and Bil. A yellow dye is obtained from the flowers. The wood is used for fuel when dry. The root bark is taken for ropes.

177. Pueraria tuberosa, *DC.* Ban Kunra, *H.;* Bharda, Badra, *Mar.;* Patal, *Gondi.*

A large climber somewhat resembling *Spathalobus* in some states and also climbs from right to left. Root large tuberous at some distance below the ground. L. 3-foliolate attaining 12″ by 10″, usually 6—9″, pale beneath with appressed white hairs. Above also with short appressed hairs. Fls. when leafless handsome blue purple or nearly white ·5″ long in fascicled racemes. Pod 2—3″ linear somewhat depressed between the seeds.

Fls. *Feb.—Apr.*

Along nalas and on hillsides.

Somewani and Dhiri-Mangli forests (Bal.); Tenduchua forest (Bil.); N. Sihawa and S. Tinawa (Rai.); N. Ward. (Targaon); Bhan. (Umarjhari).

Tuber said to be used as a tonic and for enlarged spleen, also as a cattle medicine and as a food.

178. Canavalia ensiformis, *DC.* Ban Sim, *Vern.*

A very large herbaceous climber with 3-foliolate leaves. Lflts. 2—3" (larger in cultivated forms) broadly elliptic-ovate sparsely appressed hairy beneath and on the midrib above or nearly glabrous. Petiole and rachis together 3—4", more or less pubescent or hairy. Flowers 1·25" bright rose-lake with standard 1" broad, on the swollen nodes of elongate racemes. Pod 4—5" long, thick and fleshy with 5—10 large seeds.

Fls. *Aug.—Mar.*

Jungles near villages and perhaps an escape. Taroba (N. Ch.); Nag. Pods are eaten.

Two commonly cultivated plants sometimes forming large fields have somewhat the appearance of this plant.

These are—

179. Dolichos Lablab, *L.* Popat, *Mar.* The dwarf form, Sim, *Mar.*, the climber, with racemes of purple flowers, campanulate calyx (the calyx of Canavalia is 2-lipped) and short curved pods 1·5—2·5" long *broader upwards*, either erect or climbing, often pubescent.

The pods are variable, those of some of the climbing varieties have lost their usual shape and are up to 6" long; these pods are eaten as a vegetable, while usually only the *seeds* of the dwarf varieties are eaten.

180. Vigna Catjang, *Wall.*

Also either sub-erect or (var. sinensis) twining, glabrous, with stipules ·5—·9" long inserted above the base, few-flowered long-peduncled racemes of white or usually pale yellow fls. tinged with purple, and long linear pods 8—12".

Less common.

181. Cajanus indicus, *Spreng.* Arhar, *H.*; Tur, *Mar.*

An erect shrub 4—6 ft. high with slender grey silky grooved branches, hairy leaflets 1·5—2·5" long and yellow flowers ·75" long in axillary racemes and terminal panicles. Pod 2—3", 3—5-seeded with oblique depression between the seeds.

Commonly cultivated. Often on bunds between the rice-fields. Lac has been tried on it in Raipur.

NOTE.—Many small climbers of the family Phaseoleæ are omitted as of no forest importance though some species are extensively cultivated, *e.g.*,—

182. Glycine hispida—Kali Kulthi, *Mar.*;

183. Dolichos biflorus—Pandri Kulthi, *Mar.*;

184. Phaseolus aconitifolius—Moth, *Mar.*; are frequent in cultivation.

They are mostly described in *Bengal Plants* and the *Flora of Chota Nagpur.* Phaseolus radiatus, *L.*, and Dolichos biflorus, *L.*, are wild in the Pachmarhi hills.

185. Atylosia scarabæoides, *Benth.*, is a very common small twiner, with short hairy lineate pods of which the seeds are sometimes eaten.

186. Cylista scariosa, *Ait.*

A rather extensive but scarcely woody climber with densely pubescent stems and petioles, softly hairy 3-foliolate leaves prominently venose and microscopically gland-dotted beneath. Fls. in numerous axillary, often branched racemes yellowish and red, remarkable for the papery sub-petaloid calyx which enlarges to one inch or more in fruit and of which the anterior sepals mimic the keel petals and the two posterior sepals mimic the standard of an ordinary papilionaceous plant. Pod glandular, 1-seeded.

Fls., fr. *Oct.—Dec.*

Nalas and hedges, N. Wardha and N. Chanda.

187. Rhynchosia suaveolens, *DC.*

An erect undershrub 2—4 ft. pubescent or hairy upwards with many spreading or drooping branches, 3-foliolate leaves, ovate acuminate leaflets 1—3″ long and yellow flowers axillary and terminal on numerous slender lateral shoots. Fls. single or paired on very slender peduncles. Pods oblong ·5—·75″ long, turgid, 2-seeded, lineate externally but not septate (described as septate in F. B. I.).

Fls. *Dec.—Jan.*

South Chanda, locally abundant (Sirkhonda).

Other twining or trailing species of Rhynchosia occur.

Key to Flemingia.

A. Leaves simple.
  I.—Fls. hidden in the axils of large folded bracts.
    4—6 ft. Branches not prominently angled ... ... strobilifera.
    1—3 ft Branches with sharp angles and shaggy hairs ... bracteata.
  II.—Bracts not conspicuous ... paniculata.

B. Leaves 3-foliolate.

Tall scarcely branched erect 5—6 ft., fls. in bracteate spikes ...	stricta.
Tall 4—5 ft., fls. in hairy involucrate heads	involucrata.
Shrubby 2—4 ft. with plicate lflts. petioles ·75—1″	lineata.
Shrubby 4—6 ft., lflts. elliptic not plicate, petiole with narrow wing or margined	semialata.
Diffuse undershrub 1—3 ft., lflts. lanceolate petiole not winged ...	prostrata
Undershrub without aerial stem. Petioles winged	nana.

188. Flemingia strobilifera, *R.Br.* Chepti, *Mar.*

A shrub 4—6 ft. with simple lanceolate leaves 2—6″ by ·7—3″ and numerous racemes 2—3·5″ long of small white flowers in small cymes in the axils of large folded membranous cordate bracts.

Fls. *Jan.—Apr.*

Very common in Sonawani and Paraswara (Bal.); N. Ch.; S. Ch.; Bhan.; Rai.; Bil. (Sonakhan forest).

Mr. Donald states that if a man in S. Ch. (a Gond) is stricken by a devil, he obtains relief by inhaling the smoke of the burning leaves of this plant.

189. Flemingia bracteata, *Wight.*

A shrub 1—3 ft. high with simple narrow leaves 3—7″ by 1—2·5″ and mostly terminal panicled racemes 2—5″ long of large folded deeply cordate bracts broader than long. Fls. small pinkish, much as in the last. Branches prominently angled shaggy with long hairs.

Fls. *Jan.—Apr.*

190. Flemingia stricta, *Roxb.*

A tall scarcely branched suffruticose species 5—8 ft. high from a perennial stock with very large 3-foliolate leaves, narrow leaflets 6—11″ long, 3-quetrous petioles up to 7″ long and dense axillary racemes of purplish flowers conspicuous in bud by the densely imbricated brown linear-lanceolate bracts.

Fls. *Jan.—Feb.* on the new shoots.

South Chanda (Allapalli, Sironcha); Pandratolah forest (Bal.).

191. Flemingia lineata, *Roxb.*

A shrub sometimes sub-gregarious, 3—4 ft. high with 3-foliolate leaves with petioles ·75—1″ long and markedly *plicate* elliptic leaflets 1·5—2·5″ long. Panicles numerous, axillary very glandular pubescent 2—2·5″. Pod ·4″, silky and glandular.

Fls., fr. *Nov.—Jan.*

Near the Pranhita river (S. Ch.).

192. Flemingia paniculata, *Wall.*

A shrub 4—6 ft. high with rusty branches, rather large ovate-cordate simple leaves and small white or reddish flowers, in short axillary racemes or forming terminal panicles 6″ long; without large folded bracts, but with small simple ones.

Fls. *Feb.—Mar.*

S. Ch., common.

193. Flemingia semialata, *Roxb.*

A shrub 4—6 ft. high with densely pubescent angular branches and 3-foliolate leaves with elliptic leaflets 4—5″ long and narrowly winged petiole. Flowers purple ·3″ in densely bracteate axillary spikes.

Fls. *Oct.—Jan.* New leaves in *Apr.* and *May.*

Baihar and Raigarh (Bal.), frequent; Lormi (Bil.).

194. Flemingia nana, *Roxb.*

A dwarf undershrub somewhat like a dwarf edition of the last. The woody root-stock throws up annually large 3-foliolate leaves with winged petioles usually preceded by the congested racemes of small reddish flowers. Like all the Flemingias the leaves are covered with red glands beneath, which are especially abundant all over this plant.

Fls. *Mar.—Apr.* Fr. *Apr—May.* Leaves die off in the hot season.

Common under shade in all divisions.

195. Flemingia prostrata, *Roxb.*

Diffuse undershrub with brown tomentose angular branchlets 3-foliolate leaves with lanceolate leaflets. Petiole not winged, inflorescence much as in F. congesta.

Fls. *Aug.—Oct.*

196. Flemingia involucrata, *Benth.*

A strict shrub 4—5 ft. high with pubescent branches, very shortly petioled 3-foliolate leaves with narrowly elliptic leaflets and purple flowers about ·5″ in dense hairy heads surrounded by strongly-nerved oblong acuminate bracts.

Fls. *Oct.—Dec.* Fr. *Jan.—Feb.* Dies down to the root after fruiting.

Grassy places, Moharli range (N. Ch.); Panchera (Bal.); Sironcha (S. Ch.).

Key to Dalbergia.

A. Trees.
  I.—St. 9 sheath split along the top. Lflts. large roundish.
    Lflts. 3—5-cuspidate. Corolla yellowish ... ... Sissoo.
    Lflts. 5—7-obtuse. Corolla white ... latifolia.
  II.—St. diadelphous 5+5. Lflts. mostly elliptic.
    Lflts. ·5—1·5″. Fls. ·3″. Pods ending in a sharp wedge ... paniculata.
    Lflts ·75—2·25″. Fls. ·3—·5″. Terminal wedge of pod with rounded sides and blunt mucro ... lanceolaria.
B. Woody climber. St 5+5 ... ... volubilis.

197. Dalbergia Sissoo, *Roxb.* Sisu, Shisham, *H*, *Mar.*

Tree with odd-pinnate leaves, 3—5 rhomboid or roundish cuspidate leaflets 1—3″ long and yellowish flowers in dense panicles 2—3″ long. Fls. with new leaves in *March* and *April.* Pod remains on the tree up to the next flowering season.

Not indigenous, but growing remarkably well when sown or planted on ground free from weeds and is largely introduced into Nagpur.

198. Dalbergia latifolia, *Roxb.* Shisham, *H.* (Usually distinguished from the last by being called 'Pahari Shisham'); Kala Rukh., *Mar.*; Jitregu, *Tel.*

Tree with grey flaking bark, blaze cream-coloured or white streaked with yellow, rapidly turning brown, odd-pinnate leaves with 5—7 orbicular obtuse or emarginate leaflets 1—4″ long and white fls. in lax panicles 2—4″ long.

Fls. *Sep.* when the tree is in full leaf. Fr. *Jan.—Feb.*

Common in all divisions. Attains 5—6 ft. in Chanda, but trees over 4·5 ft. are seldom sound, and though it is in great request by the Gun Carriage Factory the trees have been cut or mutilated too much in the past to meet the demand, and artificial reproduction should be resorted to. The tree is succeeding well on Seminary Hill, Nagpur.

199. Dalbergia paniculata, *Roxb.* Dhobin, *H.*, *Mar.*; Muki malli, *Tel.*

A usually straight tall tree with white smooth bark, pinnate leaves with 9—15 obtuse, rounded or emarginate leaflets ·5—1·5″ long (rarely 1·75″). Fls. ·3″ pinkish or bluish, white in numerous lateral panicles 2—3″ long. Pods panicled 2—3″, 1—3-seeded.

Fls. *July*, with the leaves. Fr. *Nov.—Jan.*

The alternating bands of xylem and phlœum in the wood easily serve to distinguish the tree when cut. They render the wood useless.

The tall straight habit also distinguishes it from the next species, but on cotton soil it is sometimes low and branched. The leaves are in general much smaller than in D. lanceolaria and dry dark-grey or black, whereas those of D. lanceolaria at first dry green. Common in all divisions. Grows best on loam, but frequent on cotton soil

200. Dalbergia lanceolaria, *L.* Pesarginge, *Tel.*; Parekha, *Gondi.*

A tree, often large, with white or grey nearly smooth bark, ultimately peeling off in oblong or irregular flakes, and pale yellowish-white blaze very soon darkening. Pinnate leaves with leaflets ·75″ to 2·25″ by 1·5″. Fls. pale pink, bluish or white (the colour distinction of the flower usually given does not always hold good), ·3—·5″ in conspicuous panicles which often appear terminal from the tree being at that time usually leafless. Pods 1·5—3·5″, 1—3-seeded.

Fls. *Mar.—Apr.* Fr. *Nov.—Jan.*

The pods may be distinguished from those of the last species by the terminal wedge having somewhat rounded sides and a blunt mucro, while in D. paniculata the wedge has very straight sides, running together to a sharp point.

Specimens have only been obtained from N. and S. Chanda where it is not common. The tree will certainly be found in the more eastern divisions.

201. Dalbergia volubilis, *Roxb.* Gumar tiga, *Tel.;* Adhari, *Gondi.*

A sarmentose and scandent shrub with long green branches, 7—13-foliolate leaves and pale purple flowers ·25—·3″ long in large panicles.″ Pods oblong 2—3·5″ by ·6—·75″ stipitate. Seeds 1—2.

Fls. *Feb.* Fr. *May—June.*

In the moister forests near water-courses, N. Ch., S. Ch., Bhandara, Raipur (Laon range and Sihoa).

202. Pterocarpus Marsupium, *Roxb.* Bija, Bija-sal, *H.;* Dhorbeula, Bhula, *Mar.;* Vengur, *Gondi;* Pedegi, *Tel.*

A large tree reaching 6 ft. Bark cinerous, rough. Blaze grey-streaked, then pink finely lined, with exudation of red juice. L. with 5—7 closely parallel-veined oblong or elliptic-obtuse leaflets. Yellow fls. ·5″ long with crisped petals, in large panicles. Pod round 1-seeded winged 1—1·7" diam.

Fls. *Oct.—Nov.* Fr. *Dec.—Jan.* Nearly evergreen.

In all divisions, especially in Balaghat Hill forests and on N. Ch. sandstones. Less common on trap than on sandstone and metamorphic rocks. It is not much used as a pole and should be allowed to attain timber size as it is a most valuable plank wood. The stools are recognisable by the blackening sap.

203 Pongamia glabra, *Vent.* Karanji, *H., Mar.;* Giranji, *Chh.;* Garanji, *Gondi;* Kanji, Kanuga, *Tel.*

A small or m. s. tree with smooth grey bark and thin yellow blaze. L. with 5—7 opposite oblong or ovate shining leaflets 3—5" long. Fls. lilac ·5" fascicled on the rachis of axillary racemes. Pod flattened woody indehiscent oblong 1-seeded 1 5—2" long.

Fls. *May—June.* Fr. *Dec.—Jan.*

Appears truly wild, chiefly along nalas in South Sihawa. Is also largely planted. The oil does not appear to be much used in this circle.

204. Derris scandens, *Benth.* Chakel, *Tel.;* Tupbel, *Mar.*

A very large woody climber with pendant lenticellate branches, shining dark odd-pinnate leaves with 9—11 leaflets 1—3" long with rather obscure sec. nerves. Fls. pale rose on slender pedicles fascicled in long axillary racemes 4—10" long. Pods 1·5—3" by 4" lanceolate both ends, very narrowly winged on the upper suture. Seeds 1—2, rarely 3—4.

Fls. *Aug.—Sep.* Fr. *c. s.*

Plains and valleys, N. and S. Chanda, common.

B.—CÆSALPINIACEÆ.

Fls. irregular or sub-regular. Corolla imbricate with dorsal petal interior in bud. Stamens ten or fewer by reduction, free or united, usually declinate.

Key to Cæsalpiniaceæ

A. L. simple, usually 2-lobed, with many basal nerves ... ... Bauhinia, p 88.
B Leaflets 2, petals 0 ... ... Hardwickia, p. 92.
C L. pinnate. Branches unarmed.
  I.—Calyx-tube short, disc sub-basal. Petals 5 ... ... Cassia, p. 84.
  II.—Disc at the top of an elongated hypanthium (calyx-tube).
    Petals 0. Calyx petaloid scarlet ... Saraca, p. 87.
    Petals 3, well-developed. Fls. small yellowish ... ... Tamarindus, p. 87.
D. L. 2-pinnate (rachis much reduced in Parkinsonia).
  I.—Calyx with imbricate sepals, St. 10. Fls. usually yellow.
    Large (garden) tree . ... Peltophorum, p. 83.
    Erect shrubs (pulcherrima) or prickly climbers. Fls. bracteate. Pod wingless ... ... Cæsalpinia, p. 81.
    Prickly climber. Fls. bracteate Pod winged ... ... Mezoneurum.
  II.—Calyx with valvate lobes.
    Unarmed trees with showy flowers Poinciana. p. 83.
    Small tree, prickly, fls. not showy Parkinsonia. p. 84.

Key to Cæsalpinia.

A. Prickly scramblers or climbers. Fls. yellow.
  Lflts. 5—1". Stipules large foliaceous, Pod prickly ... ... bonducella.
  Lflts. ·25—·5". Stipules small. Pod thick fleshy 1—2" ... ... digyna.
  Lflts. ·5—1" Stipules small. Pod compressed 2·5—4·5" ... ... sepiaria.
B. Erect, unarmed. Fls. yellow or scarlet pulcherrima.

205. Cæsalpinia bonducella, *Fleming.* Sagargoti, *Mar.*

A scrambling or climbing shrub covered with short sharp prickles, those on the leaf reflexed. L. 2-pinnate, leaflets ·5—1″. Stipules large foliaceous. Racemes with long linear bracts reflexed over the bud. Fls. pale yellow ·5—·75″ diam., the smaller erect 5th petal marked with orange. Pods at first softly echinate, ultimately 2—3″ long and very prickly.

Fls. *Aug.—Oct.* Fr. *Dec.—Feb.*

Hedges. Nag., Wardha.

An oil is got from the seeds.

206. Cæsalpinia digyna, *Rottl.*

A large scrambling prickly shrub with 5—10 prs. of pinnæ and 7—12 prs. of close oblong leaflets ·25—·5″ long slightly appressed hairy beneath. Fls. showy yellow in simple axillary or extra-axillary racemes. Pod oblong 1—2″ long, thick fleshy 1—4-seeded stipitate crowned by the long style till ripe.

Fls. *July—Oct.* Fr. *Jan.—Feb.*

Bhainsajhar (Bil).

207. Cæsalpinia pulcherrima, *Swartz.*

A pretty shrub frequently cultivated in gardens and occasionally running wild in jungles near villages. It has pyramidal elongate racemes of bright yellow and scarlet flowers, the crisped petals with a very long claw.

Fls. *r.s.* and *c.s.* Fr. *c.s.*

208. Cæsalpinia sepiaria, *Roxb.* Sagargoti, *Mar.*; Gataran, *Chh.*

A straggling sub-scandent shrub with recurved prickles on the rusty pubescent branches and leaf rachis, large bi-pinnate leaves with 8—10 prs. opposite pinnæ each with 6—12 prs. of oblong leaflets ·5—1″ long. Fls. lemon yellow ·7—·8″ diam, the small 5th petal often with red lines. Pod dry 2·5—4·5″ tipped with the straight hardened style.

Fls. *Dec.—May.* Fr. *Mar.—Jan.*

Hedges. Raj Nandgaon and Balod range (Rai.); Pantora range (Bil)

209. Peltophorum ferrugineum, *Benth.*

A large tree with abruptly bi-pinnate leaves, rusty tomentose shoots and rusty panicles of showy yellow flowers. Pod 2—4″ winged. Cultivated only.

Fls. *r.s.*

Flowering and fruiting freely about Nagpur.

210. Poinciana elata, *L.*

A small or m. s. tree with 2-pinnate leaves, 30—40 leaflets on each pinna and yellow fls. in corymbose racemes. Pod 6—8″. Occasionally planted.

211. Poinciana regia, *Bojer.*

The Gold Mohur tree, with large scarlet flowers, is much planted in stations.

212. Parkinsonia aculeata, *L.* Deochinda, *Mar.*

A small tree armed with sharp thorns which represent the abbreviated main rachis of a 2-pinnate leaf and bearing 2—6 pinnæ and numerous very small leaflets attaining ·25″ but sometimes altogether absent, the flattened rachis of the pinnæ performing the leaf functions ; stipulary thorns also often present. Fls. yellow in lax axillary racemes.

Fls. *Sep.—Oct.*

A native of America but semi-naturalised and growing in abundance on some waste lands near Nagpur and other places. Does well on cotton soil.

Key to Cassia.

A. Trees.	
Lflts. 3—7″. Fls. large in drooping racemes	Fistula.
Lflts. 1·5—2·5″. Fls. in sub-erect panicles	siamea.
B. Shrubs.	
Hairy. Stipules foliaceous. Fls. corymbose	auriculata.
Glabrous. Stipules small. Fls. panicled. Lflts. lanceolate	Sophera.
Undershrubs. Lflts ovate ...	occidentalis.
C. Undershrubs or herbs. Lflts. under 6 prs.	
Lflts. ovate 3—5 prs.	occidentalis.
Lflts obovate 3 prs. only	tora.
As in tora but a gland only between lowest pair of lflts. instead of between two pairs	obtusifolia.
Lflts 2 prs. only. Herb	Abrus.
D. Undershrubs or herbs. Lflts. numerous small.	
St. 10	mimosoides.
St. 5	pumila.

213. Cassia Fistula, *L.* Amaltas, *H.;* Danbar, *Kamhar;* Behawa, *Mar.;* Rela, *Tel.;* Rera, *Gondi.*

Pods called *Bhawarphali* in Bhandara Indian Laburnum.

A small tree with smooth grey or white bark. Blaze hard red-brown slightly streaked. Leaves paripinnate with ovate-lanceolate acute leaflets 3—7" long. Racemes drooping of large light yellow flowers on long pedicels. Pods drooping black cylindrical 1—2 ft.

Fls. *May—Aug.* Fr. most of the year.

In all divisions The wood is much valued. The bark has been sought for for tanning in Chanda.

214. Cassia siamea, *Lamk.*

A moderate sized tree with leaves 6—12" long and 6—14 prs of leaflets 1·5—2·5" long and numerous large erect panicles of bright yellow fls.

Fls. *Sep.—Dec.*

Commonly cultivated and quick growing. The wood is said to be useless.

215. Cassia auriculata, *L.* Tarwa, *Mar.*

A much branched shrub 3—10 ft. with hairy twigs and leaves, and large yellow flowers in terminal corymbs. Easily recognised by the large broad foliaceous stipules (deciduous on old leaves). Leaflets 8—12 prs. elliptic obtuse mucronate hairy ·6—1". Pods 3—4", 6—10-seeded.

Fls. *Oct.—Jan.* Fr. *Jan.—Mar.*

South Chanda, chiefly on cotton soil.

This shrub (which is used for tanning in Madras) is not used in the C. P.

216. Cassia Sophera, *L.*

A shrub 4—7 ft. with 6—12 prs. of lanceolate acute leaflets 1—3″ long and yellow flowers 1—1·5″ diam. in short axillary and terminal panicles.

Fls. *Aug.—Nov.* Fr. *Mar.*

Occasional on waste land near villages. Nagpur, etc. Nunhara (Bh).

217. Cassia occidentalis, *L.*

An erect stout fœtid herb or undershrub 2—4 ft. high with pinnate leaves 6—12″ long, and 3—5 prs. of ovate leaflets 1·5—4″ long. Fls. yellow ·5—·7″ diam. in usually terminal panicled racemes. Pod 4—5″ flattened slightly curved septate with numerous seeds.

Fls. *Sep.—Nov.* Fr. *Dec.—Jan.*

Frequent on waste grounds during the rains.

218. Cassia tora, *L.* Tarota, *Mar.* Fever-weed.

An erect herb 1—2·5 ft. high with 3 prs. of obovate leaflets increasing in size from the base of the rachis upwards. Fls. ·5″ diam. axillary solitary or paired. Pods sub-terete or 4-angled slender 6—12″ long.

Fls. *Sep.—Oct.* Fr. *Nov.—Dec.* Annual.

Not much eaten by cattle and gregarious in waste places and on sites of cattle halts. The leaves are eaten as a 'sag.'

219. Cassia obtusifolia, *L.*, is said to differ by only having one gland between the lower pair of leaflets while C. tora has a gland between two pairs. The writer has not examined the question in the C. P. (but *vide Flora of Chota Nagpur*, p. 302).

220. Cassia Abrus, *L.*, is an erect herb with only two prs. of leaflets and racemes of small yellow or red flowers with only four stamens. It is common in the forests in the rains.

221. Cassia mimosoides, and

222. C. pumila with very numerous small leaflets and 10 and 5 stamens respectively are common in grass and waste lands.

223. Saraca indica, *L.* Asoka, *H.*

A very beautiful tree, only found in gardens in the C. P. with paripinnate leaves and orange scarlet flowers in dense corymbose panicles. It is the calyx and bracteoles in this tree which are showy. The corolla is suppressed.

Fls. *Mar.—Apr.* in its own home, but I have seen it flowering towards the end of the rains in Nagpur.

224. Tamarindus indica, *L.* Imli, *H.*, *Mar.*; Hitta, *Gondi*; Chinto, *Tel.*

A very large tree with paripinnate leaves with 10—20 prs. of small close leaflets ·5″ long and small red and yellow fls. in lax racemes, only 3 upper petals and 3 stamens fully developed.

Fls. *Apr.—June.*

Cultivated everywhere and occasionally found semi-wild in rocky jungles.

Key to Bauhinia.

A. Fertile st. 10. Calyx with short tube and spathaceous or 5-cleft limb.
- I.—Fls. not showy Small or medium-sized trees.
  - L. mostly under 2″ diam. Racemes simple ... ... racemosa.
  - L. mostly exceeding 2″ diam. Racemes branched or corymbose ... ... malabarica
- II.—Fls. showy. Often in gardens.
  - Fls. 1—3 axillary, yellow ... .. tomentosa.
  - Fls. in axillary racemes, white ... acuminata.

B. Fertile st. 3—5. Calyx with an elongated tube.
- I.—Large climber with large flowers ... Wahlii.
- II.—Trees (purpurea sometimes flowers as a shrub).
  - (*a*) Leaves not lobed. Fls. under 1·5″, retusa.
  - (*b*) Leaves 2-lobed or cleft. Fls. over 2″.
    - L. mostly 11-nerved. Buds acutely 5-angled ... ... purpurea.
    - L. mostly 13-nerved. Buds not angled ... ... variegata.

225. Bauhinia tomentosa, *L.* Kanchan, *Mar.*

A handsome shrub with young parts tomentose, 7—9-nerved leaves 2—3″ long, rather broader than long, lobed less than half way down into two obtuse lobes, laxly pubescent beneath. Fls. yellow or white in axillary or leaf-opposed peduncled pairs with linear bracts or bracteoles. Calyx spathaceous ·5″. Corolla 2″. Pod brown 4—5″.

Fls. *July—Aug.* Fr. *Jan.—Feb.*

Dhaba forest S. Ch.) and in village hedges, N. Ch. Not common.

226. Bauhinia racemosa, *Lamk.* Dundera, Dhondri, *Gondi;* Are, *Tel.*

A small tree with rough grey bark and dark pink blaze, pubescent or tomentose branches, small 2-lobed leaves 1—1·5″ by 1·5—2·5″ broader than long, tomentose or pubescent beneath (less so when old), simple racemes 2—3·5″ long of small whitish or yellowish flowers. Pod 4—7″ rarely 10″ long, thick and somewhat torulose.

Fls. *Apr.—June.* Fr. *Nov.—Dec.*, but pods persisting till *Apr.* Evergreen.

Very common in all divisions and frequent on dry hills.

Not much used

The short very thick podded form is chiefly found on sandstone and conglomerate and is less common than a falcate less turgid variety.

One form (Katora, N. Ch.) with the leaves attaining 4·5 or even 5″ puberlous beneath is sometimes difficult to distinguish (by the leaves alone) from B. malabarica and B. variegata, but the principal nerves are only 9 and the sub-acid taste is wanting.

227. Bauhinia malabarica, *Roxb.* Amti, Sehara, *Mar.*; Koniaphul, *Gondi*; Pula are, *Tel.*

A small tree attaining 4 ft. girth with bushy crown, bark light brown-grey nearly smooth or with narrow linear-oblong flakes when old. Blaze hard pinkish-red and pink turning red, or bright deep crimson in old trees. Branches pubescent. Leaves dark green 1—4″ diam., broader than long, usually grey and glabrescent beneath (occasionally minutely pubescent when old) with 9—11 primary nerves. Fls. subregular whitish on slender pedicels in corymbose or *branched* racemes. Pod 7—12″ by about ·7″ flattened curved beaked; when dry very closely conspicuously veined.

Fls. *Sep.—Nov.* Fr. *Jan.—Mar.* Evergreen.

Along valleys only. Bhandara (Umarjhari); South Chanda; Dabori (N. Ch.); Singpur and Sihawa ranges (Rai.).

The leaves have a pleasantly acid taste and somewhat resemble both those of racemosa and variegata.

228. Bauhinia variegata, *L.* Kachnar, *H.;* Thaur, *Mar.;* Dhondri, *Gondi.*

A small or moderate sized tree with grey longitudinally cracked bark, pale pink or flesh coloured blaze darkening on exposure, leaves 2·5 by 3″ to 6″ by 6·5″, usually about 5·5″ long, pubescent especially on the nerves and grey glaucous beneath. Primary nerves 13—15, rarely only 11. Lobes of leaf rounded. Calyx spathaceous, tube 1·24″. Petals obovate 2—2·5″ pure white or purple with one petal variegated with yellow. Buds *terete.* Pod 9—12″ by ·7—1″.

Fls. *Feb.—Apr.,* the upper part of the tree then being leafless. Fr. *Mar.—May.*

Chiefly on hilly ground. Sukri, Samnapur, Supkhar (Balaghat), S. Chanda (*f* Donald).

229. Bauhinia purpurea, *L.* Koilar, Sehara (*f.* Donald); Pedda are, *Tel.*

A small or moderate sized tree (not unfrequently flowering as a bush) with ashy or dark brown bark, blaze (underneath the outer bark) with or without a pink band, then pale yellow rapidly darkening, then nearly white, centre (on wood) yellowish Leaves deeply lobed from one-third the way down to sometimes near the base which is 9—11-nerved and the lobes have usually angular tips. Purple fls in panicled racemes. Buds acutely 5-*angled.* Pod 6—12″.

Fls. *Sep.—Dec.* Fr. *Jan.—Mar.*

Frequent along valleys, especially along the streams in all divisions.

The leaves are eaten.

230. Bauhinia retusa, *Ham.* Koilar, *Mar.* (but these names are much mixed up); Sehra, *Chh.*; Kangali, *Gondi*; Dondir, *Maria*; Tawarrukh, *Bhumia*; Nipra, *Tel.*

Blaze dark grey brown outside, then very pale pink. A moderate sized or small tree with the leaves different from the other Bauhinias described in being quite entire or only slightly emarginate. L. 4—7" broad with 7—11-nerved base. Fls. 1" diam. white in ample terminal panicles. Pod straight oblong or broader upwards 5—7" deep-red until ripe.

Fls. *Sep.—Dec.* Fr. *Feb.—Mar.* Evergreen.

Chiefly in valleys. Common in Dhamtari range, North Sihawa and South Sihawa (Rai).; Lormi and Pantora ranges (Bil.); Markhanda and Ghot S. Ch.); Bhandara, on quartzite rocks near Deori (82nd mile); Baihar and Raigarh ranges (Bal.).

231. Bauhinia Vahlii, *W. & A.* Mahul, *Mar.*, *H.*; Pawur tige, *Gondi*; Parad, *Tel.*

An immense climber, stems attaining 2—4 ft. girth, with deeply 2-lobed leaves from 3" to 18" diam. and corymbs of large white or cream coloured flowers. Pod woody, 6—12" long.

Fls. *Apr.—June.* Fr. *Dec.—Mar.* Sub-deciduous, renews leaves in *May.*

In all divisions, but chiefly on the hills and in stony places. Very common in Dhiri-Mangli forest (Bal.).

Rope is made from the bark, and the seeds are eaten.

232. Hardwickia binata, *Roxb.* Anjan, *H.*

A large and beautiful tree with bluish-green foliage and drooping branchlets with small leaves resembling those of a Bauhinia but split into two distinct basal-nerved leaflets. Fls. very small, whitish, without corolla, in axillary and terminal panicles. Pod samaroid, 1-seeded.

Fls. *July—Aug.* Fr. *Feb.—Mar.* Evergreen. New shoots in *Apr.*

Very local in wild state, south of Allapalli, and in Sironcha (S. Ch.).

Is extensively planted in Nagpur, where it grows well on the trap hills. It is best sown where it is to remain, and remains very small for the first two or three years. In Sironcha it attains 7—8 ft. girth.

C.—MIMOSACEÆ.

A. Stamens definite, 4, 5, 8 or 10.

- I.—Fls. spicate. An immense climber ... Entada, p. 9.
- II.—Fls. in globose heads, all flowers similar.
  - (*a*) Unarmed trees. St. usually 10.
    - 1. L. with one pair of pinnæ ... Xylia, p. 93.
    - 2. Cultivated trees. L. with several pinnæ.
      - Small tree. Lflts. 10—15 prs. Leucæna, p. 95.
      - Large tree. Lflts. very numerous ... ... Parkia, p. 94.
  - (*b*) Prickly shrubs or undershrubs. St. 4 or 8. Pod jointed ... ... Mimosa, p. 95.
- III.—Fls. in tassel-like heads, of two kinds, the lower sterile with long staminodes ... ... Dichrostachys, p. 94

B Stamens indefinite.

- I.—St. free. Erect or scandent trees or shrubs with thorns ... ... Acacia, p. 96.

II.—St. monadelphous. Erect, unarmed (except Pithecolobium dulce);
(*a*) Pinnæ 1 pair, lflts 1 pair only ... Pithecolobium, p. 106.
(*b*) Pinnæ and lflts. several. Principal nerve parallel to margin of leaflet. Pod thin ... Albizzia, p. 103.
Principal nerve diagonal. Pod fleshy ... ... Enterolobium, p 107.

233. Xylia dolabriformis, *Benth.* Suria, *H., Mar.;* Suaba, *Gondi;* Bhoja, *Tel.*

A large or (in C. P.) usually small tree, with brown tomentose thick branchlets, 2-pinnate leaves with only one pair of pinnæ, white flowers in globose heads on long peduncles from the axils of the fallen leaves. Petiole together with main rachis of leaf 2—5″. Sec. rachis 4—13″. Petioles swollen. Leaflets normally 5—6 prs. rarely 2—3, or 7 prs.; basal usually ovate, upper oblong-obtuse or with short blunt cusp or shortly acuminate, 2—8″, base obtuse or cuneate, sec. n. fine oblique, 7—12 prs. Glands 4—5 on rachis between upper leaflets. Peduncles 1—2″. Heads ·5″—·75″ diam. (without stamens) usually paired from the axils of the undeveloped leaves and so appearing clustered at the ends of the shoots; peduncles 1—2″. Flowers often 1-sexual. Corolla 1·5 times as long as the calyx. St. 9—10 apiculate; at the end of the apiculus there is a deciduous gland. Pistillode fulvous hairy. Pods 5—6″ woody, somewhat curved, broadest above the middle.

Fls. *Apr.—May.* Fr. ripens *Mar.*

Usually in valleys, Bhandara (on the top of quartzite escarpments at Chicholi) frequent, but rarely 3 ft. girth; N. Ch.

S. Ch., frequent (a tree of 6′ 10″ measured in Allapalli forest); Bal. (Dhiri-Mangli forest); Rai (Harrathema forest). The wood is scarcely used.

234. Entada scandens, *Benth.*

An immense woody climber with 2-pinnate leaves ending in a 2-fid. tendril, solitary or fascicled axillary or extra-axillary spikes 4—9″ long of very numerous small green flowers. Pods very large and woody 1—2 feet long with large discoid chestnut-coloured seeds 1·5—2″ diam.

Fls *Apr.* Fr. ripens *Mar.—Apr.* of following year. Deciduous *Mar.*

Ravines in the Lormi hills (Bil.).

235. Dichrostachys cinerea, *W. & A.* Sagun-kanti, *Mar.;* Velatur (*J.* Graham).

Large branched woody shrub or small tree looking like an Acacia, the twigs mostly ending in a thorn. Remarkable for its curious particoloured tassel-like heads of flowers, the lower part of the spike which is 1—2″ long consisting of imperfect flowers with staminodes ·5″ long, being bright rose-coloured, the upper yellow with minute perfect flowers. Bark grey. *Branches* armed with short lateral and terminal *straight* thorns. Leaves 2—3″ long only, leaflets minute ·05—·1″ long. Pods curled and twisted.

Fls. *Aug.—Jan.* Fr. *Oct.—Dec.*

Frequently, especially in Nag., Ward. and N. Ch. on black cotton soils

236. Parkia biglandulosa, *W. & A.* Drumstick tree.

A tree, very commonly planted, with large feathery 2-pinnate leaves 12—20″ long with, 2 glands on the petiole. Heads of narrow tubula fls. 2" diam. on long rusty stout peduncles globose with lower third constricted. Pod large.

Fls. *Feb.*

237. Leucæna glauca, *Benth.*

A small tree, or flowering as a large shrub. Leaves with 4—8 prs. of pinnæ and linear glaucous leaflets ·3—·5' long; small white flowers in fascicled or panicled heads 1" diam. Pods very numerous, brown.

Fls. *May—Aug.*

Very commonly planted, and often self-sown in moist situations.

238. Mimosa rubicaulis, *Lamk.* Chilati, *Mar.*

A weak very prickly shrub 6—12 ft. with many branches from the root. L. with 6—12 prs. (8—20 according to F. B. I.) of *distant* pinnæ 1—2·5" long and 8—20 prs. of small leaflets. Rachis beset with curved prickles. Fls. pink or whitish in pretty heads ·5" diam. becoming panicled at the ends of the branches. Pod rather falcate, thin, 3—4" breaking up into square 1-seeded joints.

Fls. *Aug.—Oct.* Fr. *Nov.—Jan.*

Branches die down or shed their leaves in the hot season.

Easily confused with the next and is believed not to occur in the Western Districts of N. Ward. and Chanda.

239. Mimosa hamata, *Willd.* Chilati, *Mar.*

Strongly resembling the last. It is distinguished chiefly by its fewer pinnæ (only 6—8 prs.) and by the pod being armed with curved prickles.

The pinnæ are also shorter than in rubicaulis, but this character is not constant.

Fls. and fr. the same time as the last.

Appears more abundant in the C. P. than M. rubicaulis and occurs in all divisions, being specially abundant in the west of the area.

M. rubicaulis is rather a plant of moister regions (though a very tomentose form occurs in the Punjab) and M. hamata of the Deccan and Bombay.

Key to Acacia.

A. Fls. in globose heads.

I.—Erect trees or shrubs.

(*a*) *Prickles stipular only. Straight. Fls. yellow. Heads axillary.*
Prickles ·25—2″. Lflts. 10—20 prs. Pod moniliform ... ... arabica.
Prickles stronger. Lflts. 8—12 prs. Pod repand ... ... eburnea.
(*b*) Prickles stipular or O. Fls. nearly white. Heads panicled ... leucophlœa.
(*c*) Prickles very small more or less 5-seriate on the branches ... Donaldi.

II.—Climbers with the prickles numerous on the branches and often on leaf rachis. Heads usually white, panicled.
Rachis clothed with pinnæ nearly to base;
Lflts. 25—40 prs. ·25 ·5″ linear ... Donaldi.
Rachis bare for 1—2″ from base with conspicuous gland. Lflts. 18—40 prs. ·1—·25″ linear ... ... pennata.
Lflts. 30—45 prs. ·25—·31″ oblong ... cæsia.
Lflts. 15—25 prs. ·3—·6″ ... ... concinna.

B. Fls. in axillary spikes. Trees. Prickles stipular short curved.

1. Lflts. under ·5″.
Bark nearly black. Pinnæ 7—22 prs. Catechu.
Bark light grey. Pinnæ 3—5 prs. ferruginea.
2. *Lflts. over ·5″... ... ... lenticularis.*

A.—Flowers in globose heads.

240. Acacia Farnesiana, *Willd.* Dei babul, *H.;* Gandhi babul, *Mar.*

A shrub or small tree. L. with 4—8 prs. pinnæ and 10—20 prs. of minute leaflets. Heads of deep yellow flowers very fragrant on axillary peduncles ·5—1" long. Pod brown thick and swollen.

Fls. *Aug.—Mar.* Fr. *Jan.—July.* Evergreen.

Often planted and semi-wild.

241. Acacia arabica, *Willd.* Babul, *H.*

A tree with deeply cracked black bark (often flowering as a shrub), armed with long, straight white thorns on the branches. Blaze very hard, similar to A. Catechu but lighter pink, white on the wood. L. 3—6 prs. of pinnæ and pinnæ with 10—20 prs. leaflets. Pod whitish deeply constricted between the seeds.

Fls. *Aug.—Dec.* Fr. *Jan.—Mar.* Evergreen.

In all divisions but chiefly on trap with cotton soil in the western divisions.

The tree does not coppice, and long grass is most inimical to its reproduction. The three varieties distinguished in Berar do not appear to be recognised in the Southern Circle. Pods as well as leaves are largely used for fodder. There is no general trade in the bark from the forests of the circle, as most of the babul tracts are now cultivated.

The 'Indian Gum Arabic' according to the Linnæan Herbarium has white thin moniliform pods. The 'true Gum Arabic' (nilotica) has not the white tomentum and the very moniliform pods have *oblique* joints.

242. Acacia eburnea, *Willd.* Dev babul, *H.*

"A small tree resembling babul but pinnæ 7—8 prs. and leaflets only 8—9, rarely 13 prs

Pods dark reddish falcate up to 3″ by $\frac{3}{8}$″ thin, flat, venulose, only faintly constricted between the seeds."—Donald.

It may usually be distinguished from the babul by the large white very conical geminate thorns, by having 2—5 prs. of pinnæ only, each with 6—8 prs. of broad leaflets. The pod also is only repand not deeply constricted.

" Dighori forest (S. Ch.) on black soil."—Donald.

243. Acacia leucophlœa, *Willd.* Hiwa, *Mar.;* Tunua, *Tel.*

Usually a small tree but attaining 6 ft. girth, with white trunk when young, when old with deeply cracked bark below and white smooth branches. Blaze light red slightly white streaked.

L. small, the 6—12 prs. of pinnæ only 1—1·5″ long. Heads small, ·25″ in copious terminal panicles, pale. Pods panicled 4—8 by ·2—·3″ tomentose.

Fls. *Aug.—Oct.* Fr. *Dec.*

Very common, especially on the trap and on the cotton soil. Not recorded from the metamorphic rocks of Bil. and Rai. (though found there on black cotton). Not of much value. Very large trees are found grown up with new growth in S. Chanda, probably the remnants of a more open forest.

B.—Flowers in axillary spikes.

244. Acacia Catechu, *Willd.* Khair, *H.;* Sandra,* *Tel.*

A small tree, usually crooked, with black bark peeling off in vertical strips, Branches mostly armed with paired (stipular) hooked prickles. Blaze very hard, vandyke brown and then deep pink. Branchlets pubescent. Pinnæ 7—22 prs. with rachis from ·5″ (on very small leaves) to 1·5″ long, pubescent or hairy. Leaflets 6- 35 prs. (mostly 12—20 prs.), ·1—·2″ long, sessile, ciliate. Fls. small white or pale yellow, crowded on pubescent spikes 2—2·5″ long. Fls. ·1″ long (excluding stamens), the corolla about twice as long as the calyx, both pubescent. Pods 2—5″ by ·6—·8″ often constricted, 4—7 rarely only 2-seeded, obtuse mucronate or beaked, base contracted into a pedicel and pubescent, above glabrescent.

Fls. *June—July.* Fr. *Nov.—Dec.*

All divisions, from the plateau of Balaghat (Jhiria), Mahasamund (Raipur), Kolsa (N. Chanda) to Dhaba forest (S. Chanda).

A valuable wood, largely used in native buildings. I have described the tree fully on account of the question of distribution of the Indian 'Khairs,' *vide* Prain (some Additional Leguminosæ, p. 509) The species obviously is Catechu *proper* notwithstanding that it bears the Telugu name 'Sandar' and that it has hitherto not been reported from the Deccan. I have not met A. Sundra, *DC.*, in our area.

245. Acacia ferruginea, *DC.* Kat Khair, Pandra Khair, *Mar.*; Safed Khair, *H.*

Fairly straight tree 2—4 ft. girth with grey bark cracking into oblong pieces. Blaze light crimson (deep crimson in the old trees) with thin white concentric lines. Prickles paired small ·1—·15″ slightly curved. Branchlets pubescent. Leaf rachis 1·5—2·5″ with 3—5 prs. stalked pinnæ each with 10—18 prs. lflts. Lflts. ·25—·35″ glaucous almost white when dry. Pod about 4″ up to 6·5″ long by ·8″, 4—6-seeded, upper suture margined.

As the tree is nearly bare of leaves at the time of flowering the spikes appear panicled.

Fls. *Mar.—Apr.* (*Jan.—Feb.* according to Witt). Fr. *Nov.—Dec.*

On trap and cotton soil in extreme south of Umrer (Nag., Ward.); Warora range (N. Ch.); Dhaba range (S. Ch.)

Wood said to be useful but softer than that of A. Catechu and lighter coloured.

246. Acacia lenticularis, *Ham.* Khair, *Bhumia;* Kolsa Kanta, *H.;* Kirngi, *Gondi.*

A pretty tree 20—40 ft. superficially resembling an Albizzia rather than an Acacia with rough brown grey bark and bright green foliage with large leaflets. Armed with slightly curved stipular prickles ·12—·19″ long. Pinnæ 2—4 rarely 5 prs. 3—5″ long. Lflts. 6—12 prs. glabrous ·75—1·5″ by ·6′. Spikes white 4—5′. Pod 5—9″.

Fls. *May—June.* Fr. *Dec.*

Both on trap and mica schist in hills.

Jhiria, Kursipar, Bhaisanghat (Bal.); Bancal, Lormi forests (Bil).

Wood said to be very hard and strong.

C.—Climbers (except in the first species) with white flowers in globose heads usually in panicles.

247. Acacia Donaldi (Sp. Nov. near pennata), Chil, Chili, *Gondi.*

A small tree up to 2·5 ft. girth with light coloured bark, very rarely scandent. Blaze slightly pink streaked. Prickles more or less 5-seriate on the branches but less obviously so than in next species. Twigs finely pubescent. Leaf rachis 3—10″ (usually 4—5·5″) with very short swollen petiole and a flattish or rudimentary gland immediately above it and between the 3—4 upper pinnæ, with very small weak prickles on the lower rounded surface. Pinnæ *extending to within half an inch of base of rachis* 10—27 (usually 16—20) prs. ·3—·5 apart, median pinnæ 1·5—2′ long. Lflts. linear 25—40 rarely 50 prs., on median pinnæ ·25—·5″ by ·03—·05″. Pods green to *pale yellow and whitish-brown,* ultimately grey, rather turgid when unripe up to ·25″ thick, of two forms (*a*) 3—5′ by ·8—1″ with about 6 oblong brown seeds, (*b*) 5—6″ by ·8′ with rounder darker seeds, base attenuate but pedicel, if any, not exceeding ·2″.

Fls. *r.s.* Fr. ripens *Nov.—Dec.*

On sandstone and quartzite plateaux extending from the Balod range eastward and northwards to the Laun range (Rai.), and Sonakhan range (Bil.).

248. Acacia pennata, *Willd.* Chilate, *H.*; Jari, *Mar.*

A large woody climber with light coloured smooth bark (very old stems are rough below) which on the branches and even in fairly old stems show longitudinal brown lines of minute prickles. Blaze bright crimson. Branches more or less 5-angled with lines of small prickles on the angles. Leaf with *basal portion of rachis bare for one-third of its length* or for 1—2″ and bearing a conspicuous gland, with raised margins about half way up the bare portion. Pinnæ about 10—20 prs. 1—2′ long and ·25—·3″ apart. Lflts. linear 18—40 prs. ·1—·25″ long. Fls white. Pods *purple* 4—6″ with cuneate base and a pedicel usually over ·2″ and often ·6″ long.

Fls. *May—Aug.* Fr. *Mar.—Apl.* (quite thin and unripe in *Dec.*).

In all districts chiefly along ravines and nalas.

249. Acacia caesia, *W. & A.* Chilhati, *Mar.*

A large scrambling climber, stems sometimes channelled, old trunk attaining 2·5 ft. girth with rough bark and brown blaze, on younger stems bark light grey nearly smooth and blaze slightly pink. Branches usually with five lines of prickles young tomentose. Leaf rachis 6—10″, armed, with 12—20 prs. pinnæ with rachides usually 3—4″ (sometimes only 2″ or up to 5″), ·4—·5″ apart pubescent. Glands basal and between 5—10 uppermost pinnæ. Lflts. oblong 30—45 prs. rigidly spreading (except in sleep) ·25—·31 by ·1—·15″ always somewhat pubescent beneath. Pods flat dry with strong sutures 3—5·5″ by ·6—1″ usually cuneate at both ends, light brown, with a rusty tomentum when young.

Fls. *May—Sep.* Fr. *Jan.—Mar.* Evergreen. New leaves in *Mar*.

Exceedingly common in all districts but more especially on rocky ground with sandstone or quartzite rocks.

N B.—This is not the Mimosa caesia of Linnæus and the name requires revision.

250. Acacia concinna, *DC.*

A scrambling climber with 4—8 prs. of pinnæ and 15—25 prs. of leaflets ·3—·6″ by ·19″. Pinnæ ·7—1″ apart. Pod thick fleshy 2—4″ long.

Fls. *Mar.—June.* Fr. *Jan.—Mar.*

It is doubtful whether this occurs in the Southern Circle but as it occurs in the Northern Circle and in the Deccan it will probably be found.

Key to Albizzia.

A. Lflts. over ·3″.
  1. Lflts. 1—2·3″ broader on the acroscopic side of the principal nerve. Bark white ... ... procera.
  2. Lflts. under 2″ broader on the basal side of the principal nerve.
    (*a*) Peduncle 2—4″ axillary or only feebly panicled. Fls. pedicelled. Pods green to yellow ... Lebbek.
    (*b*) Peduncles ·75—2″ panicled. Fls. sessile. Pods red or purple (or brown when ripe).
      Pinnæ 2—5 prs., lflts. over ·6″ ... odoratissima.
      Pinnæ 5—10 prs., lflts. under ·6″ ... Thomsoni.
B. Lflts. under ·3″ ... ... amara.

251. Albizzia Lebbek, *Benth.* Chichola, Sankesar, *Mar.*; Siris, *H.* East Indian walnut.

A m. s. or large tree with cinereous rather rough bark. Blaze deep crimson or red. Pinnæ 2—4 prs. Lflts. 6—8 prs., rarely 13 prs., 1—1·5″ long, rarely twice as long as broad, oblong rounded glabrescent, drying green. Peduncles 2—4″ long axillary or shortly panicled (from late development of the leaves). Fls. with distinct pedicels which attain ·2″ long. Pods straw coloured 1—2″ broad. Seeds large exceeding ·5″ diam.

Fls. *Apr.—June.* The pods ripen *Jan.* and remain on the tree during the hot weather when the tree is quite bare of leaves.

I have come to the conclusion that this is nowhere wild in our area. It is very commonly planted but the tree often called A. Lebbek is var. lebbekifolia of the next species.

251(*a*). A tomentose variety (var. pubescens) occurs, in which the pedicels are shorter, the leaflets are more or less permanently hairy and more narrowly oblong and, as there may be as many as 13 prs., it is practically indistinguishable in leaf only from the next species. I have suspected hybridisation.

252. Albizzia odoratissima, *Benth.* Chichwa, *Mar.* (but the name *chichwa* is often applied to any Albizzia). Terju hitta, Terju chinta, *Gondi ;* Shin dugu, *Tel.*

A small or large tree with sandy coloured grey or cinereous bark. Blaze thick, deep crimson. Pinnæ 2—5 prs. Lflts. 6—24 prs. oblong or narrowly oblong or somewhat falcate ·6—1·2″ by 25—·5″ (but see var.), usually twice to three times as long as broad and usually drying grey. Peduncles ·75—1·25″ usually panicled. Fls. sessile. Pods purplish-green to brown or red-brown when quite ripe up to ·1·25″ broad, minutely hairy. Seeds under ·4″ diam.

Fls. *May—July.* Fr. *Nov.—Feb.*

Common in all the forests. The typical tree is graceful and often with drooping foliage which is generally pubescent.

253. Var. lebbekifolia, *Haines.* Bark grey. Blaze deep crimson. Lflts. 6—11 prs. 1—1·9″ by ·4—·8″, old with minute scattered appressed hairs both sides. Peduncles under 1·25″. Pods up to 1·3″ broad and often stipitate, otherwise as in type. The shortness of the peduncles, the sessile fls. and colour of the pods easily distinguish it from A. Lebbek but with foliage only it is practically indistinguishable.

Quartzite plateaux, Warora range, and Taroba, N. Ch.; sandstone, Bejurpalli and Sironcha, S. Ch. Substantially similar forms occur along the Mul road.

254. Albizzia Thomsoni, *Brandis.* Sailari, *Gondi*; Seljhari, *Mar*; Kondalachetu, *Tel.*

A large tree attaining 7 ft. girth. Bark roughish dark grey like that of A. Lebbek. Blaze crimson (not thick) yellowish within, on young trees yellow then pink. Branchlets and young parts tawny tomentose. Pinnæ 5—10 prs. 2—4″ long. Lflts. about 20 prs, obtuse, slightly falcate, larger ·5 by ·25″ rarely ·6″ with sparse appressed pubescence beneath or glabrous except on the midrib but the minute petiolule brown tomentose. Principal nerve nearer upper margin, other smaller basal nerves 2. Heads corymbose on peduncles 1·5—2′ long Fls. pale yellow with pink anthers. Pods many red 6—8′ by ·6—1″ (Brandis says 1·5′) sutures thickened pubescent. Seeds 7—8.

Fls. *Feb.—Mar.* Fr. *Dec.* Deciduous, *Jan.—Feb.*

S. Ch. and N. Ch. extending as far north as the sandstones. Often only a small tree on the dryer plateaux.

255. Albizzia procera, *Benth.* Safed Siris, *H.*; Kinhiphata, *Mar.*; Gurar, *Gondi*; Passarjini, *Tel.*

A large tree with greenish-white bark (except below on very old trunks) and red blaze easily distinguished from the other species by the large leaflets 1—2·3″ by ·5—1·2″, which are much broader on the upper (acroscopic) side of the principal nerve. Heads 1—4-nate, copiously panicled. Pod green 4—8″ by ·5—1″.

Fls. *Aug.—Sep.* Fr. *Dec.—May.* Deciduous, *May—June.*

Along nalas in all districts but not usually common, occasional also in the damper forests and near tanks and rice-fields.

256. Albizzia amara, *Boivin.* Seljhari, *Mar.* (?)

A small tree with innovations softly yellow tomentose, main rachis 2—4″ and 6—15 prs. pinnæ 1—3″ long with numerous close small linear leaflets ·25″ long. Fls. yellow fragrant in heads ·3—·5″ diam., peduncles about 1″ several in axils of new leaves or terminal panicles (owing to late appearance of leaves). Pod 4—6″ by ·7—1″, pubescent.

Fls. *Mar.—May.*

Only seen on the Laun sandstone plateaux in Raipur. Wood said to be strong and useful.

257. Pithecolobium dulce, *Benth.* Simchita, *Tel.*

A pretty tree with spinose stipules. L. with one pair of pinnæ, each pinna with one pair only of small oblique leaflets 1—2″ long. Pod twisted.

Fls. *Jan.—Feb.* Fr. *Apr.—June.*

A native of Mexico. Often cultivated and if cut back forms a good hedge.

258. Enterolobium Saman, *Prain.* The Rain Tree.

A large tree with spreading crown and dark grey bark. Pinnæ 3—7 prs., larger with 8—10 prs. of leaflets 1—2 long rhomboid, with principal nerve diagonal. Heads rose-coloured axillary. Pod 5—8″ fleshy.

Fls. *May—June.* Fr. *Mar.—Apr.*

Often planted. Lac occurs on it in Chanda.

XXIX.—RHIZOPHORACEÆ.

259. Carallia lucida, *Roxb.* Karalli, *Tel.*

A moderate sized tree, attaining 5 ft. girth but not tall, with smooth grey bark and hard red blaze. Twigs somewhat 4-angular. L. opposite shining leathery 3 by 1·3″ to 6 by 3·2″ quite entire obtusely cuspidate with numerous close fine oblique sec. nerves reticulating within the margin. Leaf buds ·5—·75″ long, acuminate wrapped in the caducous stipules. Petiole ·25—·5′. Fls. small greenish sessile in stout dense axillary 2—3-chotomous cymes 1—2′ long. Petals inconspicuous white erose. Fr. ·25″ globose coriaceous.

Fls *Dec.—Apr.* Fr. *r,s.* Evergreen. New leaves in *Mar.* and *Apr.*

Only along flowing streams in Ahiri (Venkatapur) and Sironcha range (S. Ch.).

(I have given the usual Telegu name on account of its showing the derivation of its scientific name, but no native in Sironcha could name the tree.)

XXX.—COMBRETACEÆ.

A. Trees. Petals O.
  Fls. in solitary or panicled spikes ... Terminalia, p. 108.
  Fls. in small globose heads ... Anogeissus, p. 110.
B. Shrubs, usually climbing.
  Calyx deciduous. Petals present, minute ... ... Combretum, p. 111.
  Calyx enlarged in fruit. Petals O... Calycopteris, p. 113.

Most of the **Terminalias** have two large glands at the top of the petiole or on the base of the leaf.

Key to Terminalia.

A. Fr. drupaceous, not winged.
  I.—L. alt. and clustered at the ends of the twigs.
    Spikes simple.
    Petioles very short. Fr. glabrous compressed (cultivated only) ... ... Catappa.
    Petioles 1″ and more. Fr. tomentose, globose or pyriform ... ... belerica.
  II.—L. not clustered, opp. or sub-opposite.
    Spikes panicled ... ... Chebula.
B. Fr. with (5—4) sub-equal wings. Spikes panicled.
    Petioles very short or L. subsessile.
    Bark pale. L glabrous ... ... Arjuna.
    Bark dark. L. usually hairy or tomentose beneath ... ... tomentosa.

260. Terminalia tomentosa, *W.&A.* En (sometimes spelt Ain or Yen), Saj, *H.;* Marda, *Gondi;* Maddi, *Tel.*

A small or large tree according to locality, with grey black bark deeply cracked into squares or oblongs, crimson blaze, opp. or sub-opp. ell. or ell.-obovate or oblong leaves more or less pubescent or tomentose beneath, small greenish-white flowers in panicled spikes and a 5-winged fruit 1·5—2″ long or more, wings over ·5″ broad with horizontal striations.

Fls. *May—June.* Fr. *Feb.-Mar.* Deciduous, *Mar.—May.*

Common in all soils and situations. One of the trees prevalent on cotton soil on which, however, it is usually small Attains large girth (8—9 ft.) in narrow valleys. Reproduction excellent, but in unfavourable localities the seedlings may apparently take twenty years or so to get up, forming in the meantime bushy clumps of shoots. The ultimate stem is frequently a sympodium. Pollarded for the tusser Silk-worm.

NOTE.—A so-called 'shrub' forwarded by Mr. Rama Rao in flower from South Chanda was probably a coppice shoot. It is certainly T. tomentosa.

261. Terminalia Arjuna, *Bedd.* Arjun, *H.;* Anjan, *Mar.;* Kohwa, *Chh.;* Mangi, *Gondi;* Telaor Yer-maddi, *Tel.*

A large tree with smooth pale grey bark, crimson blaze distinctly zoned, oblong glabrescent leaves 2—3 times as long as broad, or elliptic at base of shoots. Fls. in panicled spikes. Fr. 1—1·5′ with wings less than ·5″ wide with ascending striations.

Fls. *May—July.* Fr. *Mar.—Apr.* Evergreen.

Along streams in nalas in all divisions.

Hybrids between tomentosa and Arjuna are found. One of these found near Wamanpalli (Dhaba forest) called Arjun Sadora, *Mar.* or Pandrai-En had bark and fruit of Arjuna with leaves of tomentosa.

262. Terminalia Chebula, *Retz.* Hara, *H.;* Hirda, *Mar.;* Myrabolan (the fruit, *Eng.*); Karka, *Tel.*

A small or mod. sized tree with rounded crown. Bark grey flaking. Blaze hard deep grey-brown, then red, inside yellowish. L. usually sub-opposite ovate or elliptic or ovate-lanceolate 4 by 2·25″ to 7·5 by 4″, young beautifully silvery silky, old, nearly glabrous. Petiole ·5—1″. Fls. small whitish in spikes from the upper axils and in small terminal panicles. Fruit an ellipsoid or obovoid glabrous drupe ·75—1·25″ (often wrongly called *Nuts*), 5-ribbed when dry (the stone being 5-angled).

Fls. *Apr.—May* and to a small extent *July-Aug.* Fr. *Nov.—Feb.* New shoots *Apr.—May.*

In all divisions, but in greatest quantity on the Baihar and Raigarh plateau (Bal.) in open forest and village lands on metamorphic rocks. The best myrabolans are a bright orange colour when dry and the best time for collection is when the fruit is quite ripe. A form occurs in Sironcha with very broadly elliptic or ovate obtuse leaves attaining about 9″ by 5″ and about 12 prs. sec. n.

263. Terminalia belerica, *Roxb.* Bahara, *H.*; Takha, *Gondi.*

A large, usually a straight tree with dark bark and yellow blaze. Leaf mostly clustered towards the ends of the twigs obovate or broadly elliptic. Petiole 1—2·5″. Spikes solitary axillary 4—6″ long. Drupe ·75″ diam. usually pyriform or roundish, grey tomentose.

Fls. *Feb.—May.* Fr. *Jan.—Apr.* Deciduous, *Jan.—Feb.*

In all districts but especially in moist valley forests. The fruits have little commercial value.

264. Anogeissus latifolia, *Wall.* Dhaura, *H.*; Yerma, *Gondi*; Tirman, *Tel.*

An erect mod. sized or large tree with whitish bark shed in thin roundish flakes. Blaze first a thin chlorophyl layer, then brown-pink, centre (on wood) pale brown. Leaf opp. to alt. 2—4" obtuse or rounded at both ends. Fls. in small heads ·3" diam. Fr. small coriaceous 2-winged about as long as broad with a long beak.

Fls. *June—Sep.* Fr. *Oct.—Jan.*, rarely up to the end of *Mar.* Deciduous, *Feb.—Apr.*

In all districts, very common. Attains its largest size on the sandstone areas of Chanda, where it often reaches 6 ft. girth It is much in demand for cart axles and agricultural implements. Yields a copious gum.

265. Anogeissus acuminata, *Wall.* Pars, Parsia, *Gondi;* Pasi, *Tel.*

An erect straight beautiful tree when well grown but usually found small and deformed in this circle. Branches slender drooping. Bark nearly black, cracked. L. 1·5—2" mostly sub-opp. elliptic acute at both ends, rarely obtuse, densely silky when young, thinly silky when old. Heads of small fls. solitary or several together from leaf scars and axils. Fruit broader than long.

Fls. and new leaves *Mar.—Apr.* Fr. *Apr.* Nearly evergreen.

N. and S. Chanda, along or near rivers on alluvium or sandy soil It is evidently much used, as nearly every tree is felled or pollarded. In Bengal it is used for carts and ploughs.

266. Combretum decandrum, *Roxb.* Dhobela, *H.;* Piwar bel, *Mar.;* Boddu tiga, Mundra tiga, *Tel.;* Jilbuli (applied to several species).

A large, scrambling climber, sometimes covering the highest trees with the conspicuous cream-coloured bracts of the inflorescence, at other times forming dense bushes. Bark brown. L. oblong shortly suddenly acuminate 3—7″ shining above glabrous or appressed hairy and with white tufts of hair in the axils of the strong sec. nerves beneath. Tertiary nerves sub-parallel. Fls. small in panicled spikes. St. 10. Fr. 1—1·25″ oblong or elliptic with 5 wings.

Fls. *Nov.—Feb.* Fr. *Apr.—June.* Evergreen.

Common in all districts, especially near nalas.

267. Combretum ovalifolium, *Roxb.* Piwar bel, *Mar.;* Yeda tiga, *Tel.;* Madhel (Nagpur, *f.* Graham).

Habit of last but more often climbing, the conspicuous bracts are few or absent.

L. elliptic 3—5′ turning dark-red before falling. St. 8. Fr. ·75″ with 4 wings.

Fls. *Feb.—Mar.* as the old leaves are dropping.

Chiefly along nalas. N. and S. Chanda, common; Bhan., Rai.

268. Combretum nanum, *Ham.*

An undershrub with woody root-stock, and numerous erect branches 1—2 ft. high, opp. or alt. leaves which are orbicular or obovate or lanceolate 2—4″ and are at first bright red and again turn brilliant red in December and January. Fls. in long racemes, white. Fr. 1—1·5″, 4-winged, of a pretty pink or red colour.

Fls. and new shoots *Mar.—May.* Fr. *Apr.—Aug.* Deciduous *Jan.—Feb.*

Baihar and Raigarh plateau (Bal.).

269. Calycopteris floribunda, *Lamk.* Ukshi, *Mar.;* Kukaranji, *Gondi;* Bandumurudadu, *Gondi;* Tigadaridoda, *Tel.;* Jilbuli, *Vern.* (Bhan.).

A large woody sarmentose or climbing shrub attaining 18″ girth with rusty villous shoots, opp. ovate or elliptic acuminate leaves 2·5—5″ long, very gland-dotted beneath, pubescent, rarely glabrescent. Fls. villous, without petals, in tomentose dense panicles. St 10. The fls. exhibit a tendency to zygomorphy, the style being always declinate towards the posterior sepal. Calyx rapidly enlarges after flowering with sepals ·5—1″ long surrounding the 5-ribbed fruit.

Fls. *Feb.—Apr.* Fr. *May.*

N. and S. Chanda, on the sandstones and southwards Bhan. (in the south Partabgarh and Wainganga ranges).

XXXI—MYRTACEÆ.

L. opposite, gland-dotted ...	Eugenia,	p. 113.
L. alternate, not gland-dotted.		
Fls. in elongate pendulous racemes	Barringtonia,	p. 114.
Fls. large, 1—3 in short spikes	Careya,	p. 114.

270. Eugenia jambolana, *Lam.* Jam, Jamun, *H;* Naindi, *Gondi;* Nerad, *Tel.*

A large tree. Bark brown to nearly black. Blaze red. L. opp. ell. or ell.-lanceolate 4—6″ gland-dotted Fls. white, ternate in 3-chotomous panicles. Berry 1-seeded ·5—·75″.

Fls. *May—June.* Fr. *June—July.* Evergreen. Renews leaves with flowers.

Along nalas and in villages and in all divisions.

The hill form described in *Flora Chota Nagpur* (pp. 351-352) possibly occurs in Bil.

Wood used for well curbs.

271. Eugenia Heyneana, *Wall.*

Kat Jam, *H.;* Pan Jambun, *Mar.*

A shrub or small bushy tree 8—20 ft. with narrowly oblong ell. or lanceolate acuminate leaves 3—5″. Berry ·5—·6′ oblong crowned by the cup of the hypanthium.

Fls. *May—June.* Fr. *July—Aug.*

Along rivers only Somewhat resembling a willow in the leaves.

Bhan.; N. and S. Chanda; Rai; and probably in all divisions.

272. Barringtonia acutangula, *Gaertn.* Pankumbi, *H.;* Batta, *Gondi;* Tivar, Jugli, *Mar.;* Karpa, *Tel.*

A small tree, sometimes attaining 5 ft. girth, but short. Old trees with dark grey furrowed bark, blaze cheesy thick pink. L. obovate or oblanceolate entire or denticulate clustered towards the ends of the branches, 2—5″ long (rarely attaining 9″ by 4″). Long drooping racemes (attaining 2 ft.) of fls. ·3″ diam. conspicuous from their bright red stamens. Fruit oblong quadrangular about 1″.

Fls. *Apr.—May* and also *Oct.—Dec.* Fr. *Sep.*

Along nalas and rivers, N. and S. Chanda.

273. Careya arborea, *Roxb.* Kunab, Kumbi, *H.;* Kumhi, *Chh., Mar.;* Gumur, *Gondi;* Buddadarmi, *Tel.*

A small or m. s. tree with large obovate leaves 6—15″ long, clustered towards the ends of the branchlets, slightly crenate-denticulate with 10—12 prs. sec. n. Fls. large, white and pink in few fld. spikes with large bracts and bracteoles sessile or sub-sessile. Petals 1·75″. Filaments very numerous, long. Fruits large, green 2·25—3″ diam. crowned with persistent calyx.

Fls. *Mar.—May.* Fr. *July.* Deciduous.

Fairly frequent in the damper forests in all districts.

274. Careya herbacea, *Roxb.* Bhui Kumbi, *Gondi.*

An undershrub from a woody root-stock sending up annually dwarf shoots with cuneate-obovate serrulate leaves 6—8″ long which are at first red, and one or two large terminal flowers with purplish petals 1—1·25″ long.

Fls. *June—July.* New shoots in *Apr.*

Open grass-lands on the Baihar and Raigarh plateau (Bal.).

XXXII.—MELASTOMACEÆ.

275. Melastoma malabathricum, *L.*

A beautiful bushy shrub attaining 15 ft. with 4-angled strigose branches, 3—7-basal-nerved rough leaves 3—4″ long and bright mauve flowers 1—2″ diam. in terminal clusters with conspicuous dimorphic stamens.

Fls. *Mar.—May.* Evergreen.

Along water-courses but not general.

Bal. plateau ; Sironcha and Ghot (S. Ch.).

276. Memecylon edule, *Roxb.* (Syn. M. umbellatum, *Burm.*) Var. contractum. Ali chetu, Nakrigadem, *Tel.*

A small evergreen tree 1 ft. girth or shrub, somewhat resembling a Jamun. Blaze hard thin, pink coloured. Leaves opposite lanceolate to ovate shortly bluntly acuminate leathery 1·5—2·5" long, the underside with minute black dots. Fls. in blue sub-sessile heads along the branches. Fruit a small black berry ·25" diam. The heads consist of two or three very shortly pedunculate cymes. The nerves of the leaves are very obscure.

Fls. *Apr.—May*, also *Dec.* (? *Apr.—Dec.*).

Along nalas and rivers. Gregarious along the Marwapatra nala, Singpur range (Rai.); Dina river, near Ambela, in S. Ch. (Donald); Sironcha (S. Ch.) frequent.

[This is by no means typical M. edule. *Roxb.*, nor M. umbellatum, *Burm.*, which is reduced to 'edule' in F. B. I. Mr. Craib, in charge of the Indian sections at Kew, and myself, have tried in vain to bring it under any of A. Cogniaux's species or varieties, as the lateral and transverse nerves are so indistinct that the plant becomes removed altogether from the 'edule' section of Cogniaux. It comes, however, very close to Clarke's variety 'ramiflora.' The ultimate branchlets are 4-angled or sub-terete. Petiole ·2—·25". Calyx at the time of flowering campanulate afterwards saucer-shaped, irregularly shallowly 6—8-lobed.]

XXXIII.—LYTHRACEÆ.

A. Shrub. L. gland-dotted beneath. Fls. scarlet, zygomorphic .... Woodfordia, p. 118.

B. L. not gland-dotted. Fls. regular.
Trees or shrubs. Ovary superior.
Fls. white. Sep. and petals 4 ... Lawsonia, p. 117.

Fls. variously coloured. Sepals and petals 5—8 usually 6 very long-clawed ... ... Lagerstrœmia p. 117.

C. Cultivated shrub with beautiful scarlet fls. and *inferior* ovary ... Punica, p. 118

277. Lagerstrœmia parviflora, *Roxb.* Lendia, *H.;* Sena, *Mar.;* Chinangi, *Tel.*

A small or large tree with grey or reddish bark stripping off in narrow longitudinal flakes when old. Blaze light brown. L. opp. elliptic or ovate-lanceolate acute or acuminate, foliage when old with a grey or glaucous appearance. Delicate white flowers in trichotomous panicles on the new shoots. Capsule 1—1·5″ long 3—4-valved.

Fls. *Apr.—May.* Fr. *Dec.—Jan.* Deciduous, *Feb.—Mar.*

Very common in all districts, but only attains large dimensions in valleys. Valued for poles and agricultural implements and a first-rate coppicer. Coppices from the sides of stools.

278. Lagerstrœmia indica, *L.* Crape Myrtle.

A handsome shrub with white pink or mauve flowers 1·5—2″ diam. growing well in the gardens of the C. P.

279. Lawsonia alba, *Lamk.* Mehnde, *H.*

The Henna is a small, often spinescent tree or large shrub somewhat resembling a myrtle with lanceolate or narrow-rhomboid leaves and very fragrant small cream-coloured or white fls. ·25″ diam. Capsule small globose irregularly dehiscent with very numerous angular seeds.

Fls. and fr. chiefly in cold season.

Very common in village hedges and gardens.

280. Punica granatum, *L.* Anar, *H.*

The pomegranate is either placed in this family or in the Punicaceæ. It has beautiful scarlet flowers and is often cultivated.

281. Woodfordia floribunda, *Salisb.* Dhawi, *H.*; Dhawai, *Chh.*; Phulsati, Dhaiti, *Mar.*; Jagi, *Tel.*; Jhilbila, *Vern.*, a name applied to a great variety of shrubs.

A bushy shrub, very beautiful in flower with opposite or ternate simple sub-sessile lanceolate leaves 2·5—4″ long, silvery finely pubescent and gland-dotted beneath. Fls. scarlet tubular ·5—·75″ long in fascicled cymes along the branches, somewhat zygomorphous.

Fls. *Jan.—Apr.* Fr. *Apr.—May.*

Nearly leafless in March and April.

In all districts. The minute seeds may be germinated in damp brick rubble.

XXXIV.—SAMYDACEÆ.

282. Casearia tomentosa, *Roxb.* Kala Karai, Lenga, Lenjo, *Mar.*; Tondri, Mima, *Gondi*; Chilka duddi, Kani misri, *Tel.*

Bark cinereous, rather rough, thick. Blaze hard pink or in old trees crimson with thin bands of brown, then yellowish. A small tree with pubescent twigs, oblong leaves (or the lower ones somewhat ovate or elliptic) from 2″ (at the base of the twig) up to 7″ long, entire or crenate, pubescent, especially on ribs beneath and usually pellucid dotted Fls. green ·2″ diam. in clusters axillary and from leaf scars. Capsules ·7—1·25″ long, soft, green, ellipsoid or oblong 6-angular. Seeds with scarlet aril.

Fls. *Mar.—May.* Fr. *Apr.—May.* Sub-deciduous, *Feb.—Mar.* Leaves turn red before falling.

Chiefly in the damper valleys (and often confused with Polyalthia cerasioides) Bhan.; N. Ward.; N. Ch.; S. Ch.; Bal.; Rai.; Bil.; but not very common.

The fruits are often used for killing fish, but this custom does not seem to be prevalent in the C. P. Coppices well.

283. Casearia graveolens, *Dalz.* (Syn. C. glomerata, *Roxb*, according to Brandis.) Safed Karai, Kurdan, *Mar.*; Kuria, *Gondi.*

Blaze streaked yellowish and white. A small erect tree with rather large glabrous usually elliptic leaves 4—8′ long. Fls. small greenish in dense clusters from the (usually) leafless axils. Fruits broadly ellipsoid yellow when ripe ·6—·75″ long. Seeds as in last.

Fls. *May—June*, when leafless. Fr. *May—July.* Old leaves turn copper-coloured in *Jan.—Feb.*

More common than the last in all districts.

XXXV.—CACTACEÆ.

There are two species of Opuntia (prickly-pear) found in the Circle. These have been named from a perusal of Mr. Burkill's "Determination of the Prickly-pears now Wild in India," published in the Records of the Botanical Survey of India.

284. Opuntia elatior, *Mill.* Nagphana, *H.*

A succulent plant with jointed flattened stems, leaves minute on the young shoots, curved subulate, deciduous, clusters of long, straight slender tawny or purplish-black spines at each axil, large yellow or red fls.

Fl. and fr. in hot and rainy seasons.

Very common about Nagpur and frequent in all districts.

The fruit is edible, but is covered with short bristles on the cushions.

A young Opuntia seed on germination develops two normal cotyledons from between which at once arises a clavate fleshy stem without intermediate forms. An unripe fruit will behave like a cutting.

285. Opuntia monacantha, *Haw.*

Similar to the last but somewhat different in habit and with only a single long permanent spine on each cushion.

Khairagarh State, *f. Burkill*; Bhandara, *f. Burkill*; Bilaspur.

XXXVI.—ARALIACEÆ.

286. Heptapleurum venulosum, *Seem.*

A large climbing or epiphytic shrub attaining 3 ft. girth with digitately 5—7-foliolate leaves and small yellow fls. in panicled umbels. Lflts. 2—6" long. Petioles 3—6". Petiolules 1—2".

Fls. *May—June.*

Climbing chiefly on rocks in damp localities. Highest parts of the Lormi forest (Amarkantak hills, Bil.); Laughar, Baihar plateau (Bal.).

XXXVII.—UMBELLIFERÆ.

287. Peucedanum Dhana, *Ham.* Bandra, *Bhunia.*

A perennial herb dying down annually to the thick fleshy root with long-petioled glaucous

3—5-foliolate radical leaves with lanceolate or linear-lanceolate leaflets 1—3·5″ long, and branched nearly naked stems 1—2 ft. high with compound umbels of small yellowish flowers and dorsally compressed fruits.

Fls., fr. *Apr.—June.*

Baihar and Raigarh plateau (Bal.); Lormi forest, elev. 2,000 ft (Bil.).

The root is used as a tonic by the Bhumias.

288. Carum stictocarpum, *C. B. Clarke.* Var. hebecarpa.

A herb 1·5—2 ft. high, with many slender leafy branches and 1—2-pinnately 3-foliolate leaves with the leaflets cut into linear-lanceolate segments. Fls. minute, white, in many small compound umbels. Fr. small didymous.

Fls, fr. *Jan.—Mar.*

Sonawani and Paraswara forests (Bal.); Lormi forests (Bil.).

The seeds are used in curries, etc.

289. Pycnocycla glauca, *Lindl.*, is an interesting umbellifer with rush-like stems and flowers in heads resembling superficially those of a Scabious or Composite. It occurs in the grass lands of the Balaghat plateau.

XXXVIII.—CORNACEÆ.

290. Alangium Lamarckii, *Thwaites.* Akolo, Ankol, *H.*, *Mar.;* Pru, *Gondi;* Udugu chetu, *Tel.*

A small bushy tree attaining 25 or 30 ft. girth, usually thorny. Bark light-coloured, somewhat flaking. Blaze cream-coloured, with oblong-lanceolate or elliptic leaves 3—6″ long, with somewhat unequal sub-3-nerved base, upper surface with pubescent nerves, beneath sparsely hairy and with gland-pits or tufts of hairs in the strong nerve axils. Fls. white mod.-sized fascicled, with 5—10 very narrow petals ·5—·7″ long and 20—30 stamens. Fr. a black ellipsoid drupe ·5—·7″ long crowned by the calyx-tube.

Fls. *Mar—May*. Fr. *June—July*.

More or less leafless at the time of flowering. Chiefly near nalas, but local, all divisions. Bhan. (Dongargaon, common ; N. Ch. (common along rivers at Chimur, etc.) ; S.Ch. (common in Sironcha range) ; Rai. (common in Sihawa forests); Bal (Sonawani range, Khangondi nala) ; Bil. (Khatra)

XXXIX.—RUBIACEÆ.

A. Ovules numerous in each cell.

I.—Fls. small in dense globose heads. Corolla funnel-shaped.

(*a*) Bracteoles O. Stipules and buds lanceolate. Sep. 5 Peduncles solitary ... ... Anthocephalus, p. 124.

(*b*) Bracteoles between the flowers narrow Stipules connate by their edges over the broad bud.
Sep. linear ... ... Adina, p. 123.
Sep. O. ... ... Mitragyna, p. 124.

II.—Fls. not in dense globose heads.

(*a*) Fr. capsular 2-celled, seeds small.
Fls. in drooping thyrsoid panicles Hymenodictyon, p. 125.
Fls. in erect panicles, small, white Wendlandia, p. 125.

(*b*) Fr. a berry or drupe. Petals twisted in bud.
1. Fls. corymbose. Ovary 2-celled ... Webera, p. 126.

2. *Fls* solitary or in few-flowered cymes. Branches often thorny.

Ovary 1-celled. Corolla usually with long tube ... ... Gardenia, p. 126.

Ovary 2-celled. Corolla usually with short tube ... ... Randia, p. 129.

B. Ovules solitary in each cell.

I.—Corolla lobes valvate in bud. Shrubs or small trees.

(*a*) Fls. small green or white, axillary, fascicled or umbelled. Branches often thorny. Fr. a berry.

Ovary 2-celled. Stigma large mitriform. Fr. small ... ... Canthium, p. 130.

Ovary 3—5-celled. Stigma globose. Fr. over 1" ... ... Vangueria, p 131.

(*b*) Fls. mod.-sized. Ovaries and fruits united in dense globose heads ... Morinda, p. 133.

(*c*) Fls. small in terminal 3-chotomous panicles ... ... Hamiltonia, p. 133.

II.—Corolla lobes twisted in bud. Fr. a 2—4-celled berry or drupe. Fls. corymbose or panicled.

Style not twice as long as corolla Ixora, p. 132.

Style twice as long as corolla ... Pavetta, p. 132.

III.—Corolla lobes valvate in bud. A scrambling herb with whorled leaves ... ... Rubia,

291. Adina cordifolia, *Hook. f.* Haldu, *H.*; Kalmi, *Kamar;* Uaspu mundi, *Gondi;* Paspu Kadmi, *Tel.*

A large tree with light-coloured bark patchy from exfoliation. Blaze pink with an inner white border. Wood yellowish. L. large broadly ovate or orbicular, cordate 4—8" long and broad. Stipules sub-orbicular enclosing the terminal bud. Heads ·75—1" diam., long peduncled, usually in axillary rows of three.

Fls. *June—July*. Fr. *Feby.—May*. Deciduous, *Feb.—May*.

In all districts, but not usually common. Attains large size on the sandy soils of N. and S. Chanda, especially in hills. Both timber and poles are used in building, and planks used for doors.

292. Mitragyna parvifolia, *Korth.* (Syn. Stephegyne parvifolia, *Korth*) Karam, kaini, kalmi, *H.*; Chimia mundi, *Gondi*; Kadmi, *Tel.*

A large tree with bark and blaze somewhat similar to the last. L. broadly elliptic 4—6′ by 3—4″. Stipules broadly oblong enclosing the terminal bud. Heads of fls. 1″ diam., 1—3 together, each with two pale-coloured leaves (bracts) near the top of the peduncle.

Fls. *May—June*. Fr. following *Mar.* and *Apr.* but ripe seed also collected in *Nov.* (in Chota Nagpur). Deciduous, *May*.

In all districts. Common on cotton soil and loam, especially near rivers and often forming second growth forest. It is considered inferior to Haldu

293. Anthocephalus Cadamba, *Miq.* Kadam, *H.*

A large tree with horizontally spreading branches, smooth brown bark, thick yellow-brown blaze, white on the wood. L. large elliptic-oblong or ovate 5—10″ long, with usually sub-cordate base and 8—15 prs. strong sec. nerves. Stipules enclosing the terminal bud, narrow lanceolate ·5—·6″ long. The ripe fruits are coalescent into a large yellow pseudocarp which is eaten.

Fls. *May—July.* Fr. *Aug.—Oct.*

In the villages of Raipur (esp. Dhamtari) and Bilaspur districts, but not seen wild in the Circle; Balaghat station.

294. Hymenodictyon excelsum, *Wall.* Bhorsal, Bhawarmal, *Mar.;* Bhawar, *Kamar;* Potur, *Gondi;* Marich, *Chh.;* Dudipa, *Tel.*

A large or m. s. tree with dark-grey thick rugged bark. Blaze soft pale pink streaked white, or nearly white streaked brownish-red or yellow. L. towards the ends of the branches ovate to very broadly elliptic 4—10" by 3—6", softly pubescent. Stipules deciduous. Petiole 1—4". Fls. greenish ·25', crowded in dense sub-erect or drooping tomentose panicles 3—6" long, which are subtended by a pair of spreading long-petioled foliaceous bracts.

Fls. *Aug.*

It is leafless from November or December to May, when it may be easily recognised by its large drooping pyramidal persistent panicles of small reflexed capsules and the dry persistent foliaceous bracts.

Not very common. Chiefly in valleys on sandy soils. N. Ward.; Bh; N. Ch.; S. Ch.; Rai.; Khairagarh.

295. Wendlandia exserta, *DC.* Till, *Mar.;* Mogra, Tillai, *Gondh.*

A hoary pubescent or tomentose small tree with ovate-lanceolate acuminate leaves 4—8" long, persistent recurved stipules and panicles of very fragrant small white flowers.

Fls. *Feb.—Apr.* Fr. *Apr.—May.* Evergreen.

Chiefly on broken ground and in second growth forest. Not common, but locally abundant.

Appears to require a nearly clean seed-bed in order to germinate. Baihar range (Bal.); Dhamtari, Singpur and Sihawa ranges (Rai.); Elchil (S. Ch.).

A specimen sent by Mr. Rogers from Chikalda (Berar) had leaves merely acute, not acuminate.

296. **Webera corymbosa**, *Willd.*

A large shrub with glossy mostly oblanceolate-oblong leaves, somewhat similar to those of a Gardenia or of the Cherry Laurel but smaller, 3—7″ long, suddenly contracted to a short acute tip. Petiole ·3—·5″. Fls. ·4—·6′ diam. white in 3-chotomous corymbs, salver-shaped, fragrant, with the sessile anthers on the throat exserted nearly as long as the fusiform stigma. Berry black ·25″ diam.

Fls. *Nov.—Dec.* Fr. *Dec.—Jan.* Evergreen.

South Chanda, Dhaba and Sironcha, along sandy nalas.

Key to Gardenia.

A. Thornless.	
Leaves 4—10″ very broad. Corolla tube 2—3″	latifolia.
L. 4—8″ elliptic acute both ends. Cor. tube 1·5—2·5″. Sepals linear-subulate...	lucida.
L. 1·5—3″ obtuse both ends. Cor. 1·5—2·5″. Sepals triangular	gummifera.
B. Thorny. L. 1—4″	turgida.

297. **Gardenia lucida**, *Roxb.* Dikamali, *H.*; Karenga, *Tel.*

A large handsome bushy shrub with elliptic oblong leaves 4—8″ long, acute both ends, with 20—35 prs. sec. n. Fls. large, white fragrant, calyx-lobes linear-subulate ·2—·5″ corolla-tube 1·5—2·5″. Fr. ovoid with thin shell.

Fls. *Apr.—July.* Fr. *Apr.—June* (of next year). Evergreen.

Chiefly along sandy nalas in all districts, while the next species usually occupies the higher or more clayey soils. Very abundant on lateritic soils about Mahasamund (Raipur).

The gum is used especially as an antiseptic for wounds. For sowing it is preferable to separate the numerous seeds, though in the forest the seeds of a whole fruit (which has fallen and rotted) will often germinate together.

The seedlings do best in partial shade.

Var. gummiferoides, *Haines*.

A small deciduous tree with white trunk as in gummifera, not branched down as low as in lucida. L. with attenuate base sub-sessile acute, sec. n. 14—18 prs., calyx-lobes ·1—·2″ linear-subulate, the corolla-tube is less hairy than is usually the case with gummifera.

Fls. *Feb.*

Balod range, Raipur; on high ground.

(This may be a hybrid between lucida and gummifera, but the two species show intermediate forms in the C. P., and Brandis appears to have confused the fruit of the two species. In the field this more resembles '*gummifera*,' in the herbarium it inclines to '*lucida*')

298. Gardenia gummifera, *L.* Dikamali, *H.;* Kurmuri, Karmari, *Mar.;* Kulmuri, *Maria;* Kuru, Lahan kudu, *Gondi;* Chita mota, *Tel.*

A large handsome shrub with white bark, sub-sessile, shining, oblong to obovate leaves 1·5—3″ long, often with narrow cordate base and 12—16 prs. sec. n., usually obtuse. Fls. large white fragrant, sub-sessile, calyx-lobes ·1—·2″ triangular acute or rarely acuminate. Corolla-tube 1·5—2·5" long and lobes 1—1·5". Fr. ovoid or ellipsoid 1—1·5" with fleshy mesocarp.

Fls. *Feb.—May*, especially when the bushes are bare of leaves, but sporadically at other times. Fr. *June—July*. Deciduous.

Chiefly on clayey loams. In all districts, but somewhat local. Abundant and well grown on schists along Mohgaon-Baihar road.

Like the last it yields a clear yellow resin from wounds in the bark and at certain season a clear drop of gum (resin) completely covers the leaf buds. The fruit is eaten.

299. Gardenia latifolia, *Aiton.* Papra, papar, *H.;* Paria, Donga, Kuru, Gogal, *Gondi;* Ghogar, *Mar.;* Gegar, *Tel.*

A small bushy tree with smooth pale bark. Large opp. or 3-nate broadly elliptic or orbicular sub-sessile leaves 4—10" long with about 12 prs. sec. nerves. Fls. large white 3—4" diam. Calyx teeth 5—9 unequal lanceolate. Cor. tube 2—3". Fr. 1·5—2" diam.

Fls. chiefly in *Apr.* when leafless and with new leaves in *May*. Fr. ripens about eight months after flowering.

Sometimes epiphytic. Common in all divisions.

300. Gardenia turgida, *Roxb.* Khurur, *H.;* Phetra, Pendra, Safed phetra, *Mar.;* Yerra bikki, *Gondi;* Telelka, *Tel.*

A straight erect small tree with narrow crown, white or pale grey bark and rigid branches armed with straight thorns. Blaze with a chlorophyll layer, then white with yellow specks, cream-coloured on wood. L. 1—4" elliptic or usually obovate, sometimes orbicular and densely tomentose (var. montana). Fls. white. Males ·5—1". Females larger, solitary. Fr. large globose 1·5—2" diam.

Fls. *Apr.—May*, mostly, when leafless, but also at other times. Fr. takes about one year to ripen. Common in all districts.

301. Randia uliginosa, *DC.* Pindarù, *H.*; Kumbikum, Telka, Katil, *Gondi;* Dudhkela, Kala phetra, Tel pendra, Karphendra, *Mar.*; Kuvenka, *Tel.*

A shrub or small tree with thick black branches, sometimes thorny. Handsome when in flower with large elliptic or obovate fascicled leaves 2—8" long and solitary pure white flowers. The fls. are dimorphic, large and sessile or smaller and peduncled, but some fls. 1·5" diam. have a penduncle over 1". Berry large green or yellowish ellipsoid 2—2·5".

Fls. *May—July.* Fr. *Dec.—Apr.* Deciduous *Feb.—Apr.*

In Chota Nagpur the unripe fruit is eaten and makes a good vegetable when cooked, but only a few of the Malias appear to know this in the C.P.

Chiefly, and very common, on cotton soil in all divisions.

302. Randia dumetorum, *Lamk.* Mainphal, *H.*; Ger, Mainhar, *Mar.*; Manhar, *Gondi*; Mendhir, *Chh.*

A small bushy tree or very large shrub with smoothish but cracked grey bark and thick soft pink or reddish blaze. Branches usually armed with straight axillary thorns. L. mostly clustered on short branchlets 2—4" obovate obtuse with base narrowed into a very short petiole somewhat pubescent. Fls. white turning yellow ·5—1·25" diam. with short campanulate tubes ·25—·4" long. Fr. yellow when ripe, globose or ovoid ·75—1·25" diam. crowned by the calyx-tube.

Fls. *Apr.—June* with new leaves. Fr. *Aug.—Jan.* More or less deciduous *Mar.—Apr.*

Bhandara, common; N.W. (Magardokra forest; N. Ch.; Baihar and Raigarh ranges (Bal); Bil.; Sihoa (Rai.) common.

The fruit is used for intoxicating fish. It has a most agreeable smell, but produces an uncomfortable burning in the throat. Mr. Innes (Report on Famine Foods) states that when *unripe* it is boiled and eaten but the ripe fruit is rather poisonous.

Opinion of its edibility differs among the Gonds.

803. Canthium parviflorum, *Lamk.* Katbor, *Mar.*; Balasu, *Tel.*; Bersia, *H.*

A large shrub or small tree, with grey bark longitudinally flaking when old, and rigid branches conspicuously armed with opposite decussate pairs of strong thorns above the axils. L. ·5—3" long elliptic, ovate, obovate or orbicular, base usually narrowed into a short slender petiole, glabrous except round the grandular pits in the nerve axils of some of the leaves. Sec. nerves 3—5 prs. raised translucent. Fls. small yellowish 4-merous in short dense cymes. Fr. yellow subglobose ·5—·75" diam. on peduncles about ·5" long, with an apical areole surrounded by the 4 short linear sepals. Pyrenes 2.

Fls. *May—July.* Fr. *Sep.—Nov.* Deciduous *Apr.—June.*

Chiefly on cotton soils in open ground. N. Wardha (common Bori); N Chanda (common in Minjhari block, etc); S. Chanda, common; Khondra (Bil).

The natives often confuse it with Randia dumetorum. (There is frequently a pair or fascicle of leaves below the thorns, due to the development of an axillary bud the subtending leaf of which and of the thorn has fallen.)

304. Canthium didymum, *Roxb.* Nuna akalu, *Tel.*

A shrub or small tree with spreading or drooping compound branchlets, bifarious ovate or lanceolate-ovate acuminate leaves 3·5—6" by 1·5—6" by 1·5—3·25" which are dark-green and shining above and pale beneath with 4—6 prs. sec. n., of which the first is close to the base. Nerves usually with gland axils. Petiole ·3". Fls. long-pedicelled small greenish 5-merous, ·25" diam. in very dense short peduncled corymbose cymes. Fr. black globose ·3" diam. with two pyrenes.

Fls. *Feb.—Mar.* Fr. *Apr.—May.* Evergreen. Along sandy nalas. Sironcha range (S. Chanda only.

305. Vangueria spinosa, *Roxb.* Petu. *Gondi;* Mainphal (from confusion with Randia dumetorum), *H.*

A large shrub or small tree, often armed with long, straight thorns, with ovate ell. or oblong acute or suddenly acuminate leaves 3—4", rarely a few 6" by 3" (only 1·5—2·5" at time of flowering), often fascicled and more or less pubescent. Small green sub-globose fls. ·12" diam. in dense axillary cymes. Calyx lobes 5 linear spreading corolla lobes triangular cuspidate, throat villous with white jointed hairs. Ovary 5-celled. Stigma large globose. Fruits 1—1·5" diam. globose, green marked with a large apical areola, with 1—5 woody pyrenes.

Fls. *Apr.—May.* Fr. *Aug.—Oct.* Deciduous *Mar.—Apr.*

Chiefly in the eastern divisions. Raipur; (Laon and Singpur-Khallari ranges, on laterite); S. Pantora range, Bilaspur; S. Chanda, rare *f* Donald.

The fruit is eaten.

[Most of the C. P. specimens belong to variety *mollis* with very pubescent leaves, base of leaves rounded then somewhat decurrent on the petiole. A specimen from Pondi, Chanda, much less pubescent and with cuneate leaf base appears to be another variety.]

306. Pavetta indica, *L.* Papidi, *Tel.*

A large shrub with elliptic or obovate softly pubescent leaves 3—8" long with petiole ·5—1" long. Large 3-chotomous corymbose pubescent panicles of slender white fls. ·5—·75" long with very slender style exserted ·75—1" beyond the corolla throat. Fruit globose black ·3" diam. with two pyrenes.

Fls. *June—Aug.* Fr. *Oct.—Dec.*, and shrivelled berries may be found much later.

In the damper forests and northern slopes of hills in all divisions. Common in Sihoa (Raipur), Bilaspur and South Chanda.

307. Ixora parviflora, *Vahl.* Lokhandi, *H.*, *Mar.*; Disti, *Gondi*; Gorwi, Koripal, *Tel.*

Usually a small tree with smooth very coriaceous glabrous oblong or elliptic sub-sessile leaves 3—6″ by 1 5—2·5″ with rounded or cordate base and compact panicles 2—6″ long of smallish white sessile scented fls. ·3″ long. Petiole sometimes ·3′ long. Fr. ·25—·3″ diam. depressed globose black and shining.

Fls. *Mar.—May.* Fr. *May—June.* Evergreen.

Along nalas in all divisions. Also on cotton soil and in the damper forests but rarer.

In Sironcha it attains 20″ girth, with pale grey, rarely smooth bark and flesh-coloured blaze.

308. Morinda tinctoria, *Roxb.* Ahl, *H.*; Tzogar, Chogar, or Togar mogi, *Tel.*

A small tree 15—25 ft. high and up to 3 ft. girth, bark brown or grey, corky. Blaze grey-brown. Twigs often square. Leaves large ovate or obovate or broadly elliptic or upper oblanceolate. Fls. white ·75—1″ diam., with tube ·5—·7″ long in solitary or 2-nate leaf-opposed or terminal stalked heads. Fr. a large pseudocarp with prominent drupels.

Fls. *May.* Fr. *Jan.—Feb.*

Kota (Bil).

Var. **tomentosa.**

Branchlets pubescent or tomentose, L. elliptic tomentose or pubescent up to 10″ (only 3—5″ at the time of flowering). Stipules caudate. Pseudocarp smooth.

Frequent, N W.; N. Ch. (abundant near Karsinghi); S Ch

309. Hamiltonia suaveolens, *Roxb.*

A shrub, fœtid when bruised, sometimes 10 ft. high with erect branches, stiff leaves 4—9″ by

1·5—3″ and large terminal 3-chotomous panicles of small sweet-scented 4—5-merous white or lilac fragrant fls. ·5—·6″ long which are clustered on the branches of the panicle. Fr. a small 5-valved capsule.

Fls. *Aug.—Jan.*

In rocky places, chiefly on the cool sides of hills and valleys. On quartzite ridges, Bawanthari range (Bhandara); Sonawani range (Bal). On trap in Hingni range (Nag. Wardha).

310. Rubia cordifolia, *L.* Manjeti, *Bhumia.*

A herb scrambling by means of its scabrid stems and whorled ovate-cordate long-petioled leaves. Fls. minute deep yellow in panicled cymes. Corolla rotate. Ovary 2-celled. Fr. ·12—·17″ diam. fleshy, didymous.

Fls. *r. s.*

Lormi forests (Bil); elev. 2,500 ft.

It yields a dye (Madder). It is curious that the Bhumias give the same name to the plant as do the Nepalese (*viz.*, Manjit).

XL.—PLUMBAGINACEÆ.

311. Plumbago zeylanica, *L.* Chitrak, *Vern.* (Graham).

A shrub with long rambling green branches very glandular towards the inflorescence, alternate ovate or ovate-oblong leaves and long panicled spikes of pretty long-tubed white flowers, ·5—·75″ diam., easily recognised by the persistent ·5″ calyx covered with stalked glands. Filaments slender free with purple anthers.

Fls *July—Dec.*

In open rocky places but not common. Graham says that the plant is used in Nagpur as a dressing for enlarged glands.

XLI.—MYRSINACEÆ.

Fls. diœcious, greenish-white, racemose ...	Embelia.
Fls. 2-sexual, pink, cymose	Ardisia.

812. Embelia robusta, *Roxb.* Baibarang, *H.;* Bawrin, Wauring, *Mar.;* Kopedilduli, *Gondi.*

A shrub or small tree with light grey lenticellate branches, alt. ell. or obovate acuminate or obtuse leaves 2—6″ with a very short rusty pubescence when young and with minute red glands.* L. pale beneath and glabrous in age Fls. small diœcious greenish white in axillary and extra-axillary racemes ·5—1·5″ long with gland-dotted calyx. Fr. red sub-globose ·12—·17″ diam.

Fls. *May—July.* Fr. *Dec.—Jan.*

Not uncommon in shady places. N. Chanda and S. Chanda common; Bhandara; Balaghat; N. Wardha.

The fruits are used medicinally.

813. Ardisia solanacea, *Roxb.* (Syn. A. humilis, F. B I.). Budhara, *Chh.*

A shrub or small tree attaining 25 ft. with large, bright green rather fleshy leaves 4—8″ narrowed into a petiole ·25″ long, clustered towards the ends of the branchlets. Moderate-sized pretty rose-coloured waxy fls. ·75—1″ diam. with yellow stamens in axillary peduncled often contracted racemes. Berry ·3—·5″ diam., depressed globose, black when ripe.

Fls. *Apr.—May.* Fr. *Oct.—Jan.* Evergreen.

Along streams. Machligutta forests (S. Chanda); South Sihawa Raipur; Lormi range (Bilaspur) frequent.

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* Sometimes only visible on the margin when the leaf is held up to the light.

XLII.—SAPOTACEÆ.

Calyx-lobes 4, petals 6—12 ... ... Bassia.
Calyx-lobes 6—8, petals 16—20 ... ... Mimusops.

314. Bassia latifolia, *Roxb.* Mohwa, Mahua, *H.;* Guli (the fruit), Irku, irup, *Gondi;* Ippa, *Tel.*

A large tree with the leaves clustered towards the ends of the branches and numerous ovoid-campanulate cream-coloured fls. on long rusty tomentose pedicels fascicled at the leaf scars.

Bark nearly smooth brown. Blaze thick red beneath the thin outer brown layer, exuding a milky juice.

Fls. *Feb.—Apr.* Fr. *June—Aug.*

It is more or less leafless at the time of flowering, but fls. with new leaves in April.

A well-known and very common tree in all divisions. Corollas eaten raw and cooked (after drying) A spirit is also distilled from them. The fruit is eaten. A cooking and lighting oil is expressed from the seeds, the value of which has risen considerably in recent years. The wood is good, and is used for oilmills, and in building for beams and chowkats.

The tree is easily grown from seed and coppices well if felled in the hot weather, but not in the rains.

Germination hypogæal.

315. Mimusops hexandra, *Roxb.* Khirni, *H., Mar.;* Manchi pala, *Tel.*

A large tree, with rough grey bark and bright crimson blaze exuding drops of milky juice (attains 7 ft in Sironcha) or flowering as a *shrub* in some localities. L. alt. obovate-oblong obtuse or emarginate 2—4″ shining crowded at the ends of the branchlets. Fls. ·25" diam, white or cream, peduncled, in axillary fascicles, rotate, with 6 calyx lobes and multiples of 6 petals. Berry ellipsoid ·5".

Fls. *Nov.—Dec.*, also *June*. Fr. *Apr.—June.*

Along sandy nalas in N. and S. Chanda, frequent; Sirpur range (Rai.).

In very dry places, often only a shrub. Does well also in lime soils and is common on the marl in the Sattara forest. There may be two varieties: *(a)* a large May—June-flowering form with tomentose pedicels and calyx, and *(b)* a smaller Nov.—Dec.-flowering form with nearly glabrous pedicels and calyx. Fruit eaten.

316. Mimusops Elengi, *Roxb.*, with elliptic or oblong finely nerved leaves 3—4" long and a yellow ellipsoid or ovoid 1-seeded fruit 1" long, is very common in gardens.

Fls., fr. *Mar.—Apr.*

XLIII.—EBENACEÆ.

Key to Diospyros.

A. Armed with thorns.	
Shrub or tree with rough dark bark. L. 1—2"	... Chloroxylon.
Tree with smooth light bark. L. 2—6"	... montana.
L. 6—7·5" very pubescent or hairy	... No. 319.
B. Unarmed.	
L. 1—2" pubescent, ell or obovate	... Chloroxylon.
L. 2—6" glabrous or pubescent, ell. or ovate always alternate ...	... montana.
L. 4—12" hairy or tomentose, broadly elliptic, opposite or sub-opp.	... melanoxylon.
L. 5—12" quite glabrous, oblong, alt.	... Embryopteris.

817. Diospyros Chloroxylon, *Roxb.* Tupru (Sironcha); Andoli, *Mar.*

A shrub or small tree with rough dark grey bark and branches often armed with stout thorns. Branchlets rusty tomentose. L. 1—2" or attaining 2·25 by 1·75" ellip. or obovate obtuse with rounded base, pubescent. Fls. very small, white, 4-merous. Calyx strigosely hairy ·3" diam. in fruit. Fr. ·3" diam.

Fls. *r. s.* Fr. *Dec.—Apr.* Evergreen (?).

Common on cotton soil, N. and S. Chanda.

818. Diospyros montana, *Roxb.* Bistendu, *H.*; Ektemru, Wietemru, *Mar.*; Michi timri, Muchhi tumri, *Gondi*; Mucha tunki, *Tel.*

(Brandis and F. B. I include also D cordifolia, *Roxb.*, which is quite a distinct tree, under this species.)

A small or m. s. tree, attaining 4 ft. girth and 30 ft. high, with green or reddish exfoliating smooth bark, often armed with large conical thorns. Blaze with a green chlorophyll layer, then yellowish. L. 2—4' when in flower, attaining 6·5 by 3·5" in old leaves, glabrous or pubescent, base obtuse rarely slightly cordate or acute. Petiole ·15—·3" long. Male fls. in simple 3-fld. or compound cymes, ·25—·3" long and broad. St. in prs. 12—16. Fem. fl. solitary axillary, green or yellow, with four large rounded lobes. Staminodes 2, 4 or 8, usually 4. Fr. globose or ovoid greenish-yellow, finally black ·7—1" diam.

Fls. *Mar.—May.* Fr. *Nov.—Jan.*

There appear to be two varieties which pass into one another :—

(*a*) Leaves always quite glabrous with very reticulate fine venation, more membranous than the next. S. Chanda.

(*b*) Kanjilali (Duthie *sp. in parte*). Leaves pubescent or glabrescent, often more coriaceous when old, more grey in appearance.

This and intermediate forms have been collected from Bhandara (Gotangaon), Bilaspur (Lormi), Raipur Hatathema forest, Sitanadi) and S. Chanda The species occurs in all divisions.

The wood is hard and strong, but not much used. The fruit is said to be poisonous.

319. Another very thorny Diospyros with very pubescent or hairy sub-membranous ell-oblong acuminate leaves 6—7·5" long may be a new species, but it has not been collected in flower or in fruit. Raipur.

320. Diospyros melanoxylon, *Roxb.* (including D. tomentosa, *Roxb.*) Tendu, *H.*; Temru, *Mar.*; Tumri, *Gondi*; Tunki, *Tel.*

A small or large tree (attaining 6 ft. girth) with black bark breaking into rectangular scales. Blaze black and grey streaks, then striated pink, finally chrome yellow. L. mostly opp. or sub-opp. broadly elliptic to sub-orbicular with rounded base 4—12" more or less hairy or tomentose beneath with strong 6—10 prs. sec. nerves. Excessively variable. M. fls. in peduncled tomentose cymes. Calyx funnel-shaped acutely toothed. Cor. tubular. Fem. solitary, calyx attaining 1″ diam. in fruit. Fr. 1—1·5″ diam., smooth and yellow when ripe.

Fls. *Apr.—May.* Fr. *May* (following). Nearly evergreen.

Common everywhere, attaining its largest dimensions on metamorphic rocks in the saddles of the hill ranges.

It reproduces itself copiously from root-suckers and coppices freely. It is highly prized for poles. As a fuel the showers of sparks emitted are against its use. The fruit is excellent, and as one-seeded berries occur, it would probably repay cultivation.

NOTE.—With regard to the separation of D. tomentosa and D. melanoxylon, *vide* "Forest Trees," "Indian Timbers" and "Flora of Chota Nagpur." Var. melanoxylon has generally narrower leaves, often acute base and apex, and is said to have the sec. nerves raised above, whereas Var. tomentosa has usually rounded or obtuse leaves and sec. nerves impressed above. Both varieties occur mixed up and seem to me often indistinguishable, but tomentosa is perhaps more eastern in its distribution.

321. Diospyros Embryopteris, *Pers.* Maka Tendu, Kala Tendu, Gab, *H.*; Timburi, *Mar.*; Niti Tunki, *Tel.*

A handsome tree with low spreading branches almost to the ground, smoothish black bark, and large coriaceous oblong narrowly oblong glabrous shining leaves 5—9″ long or more. M. fls. white fragrant in axillary usually 4-fld. umbellate cymes. Fem. fls. 1″ diam. solitary. Conspicuous in fruit from the large globose berries 2·5—3′ diam rusty red from the tomentum.

Fls. *Apr.—May.* Fr. *Jan.—Apr.* Evergreen.

Along nalas only, especially deep ravines in hill ranges.

S. Chanda, frequent; Raipur, frequent (Baloda, Barbhum, Mawarpathra, Maramsili); Bhandara (Nishami Hill forest).

The fruit is exceedingly full of tannin and is only eaten by monkeys.

XLIV.—OLEACEÆ.

A. Corolla lobes imbricate.
  (*a*) Fruit baccate Erect or climbing shrubs.
    L. 1—3-foliolate, petiole articulate. Jasminum, p. 141.
  (*b*) Fruit dry or capsular. Trees or large shrubs.
    L. simple. Fruit leathery capsule. Nyctanthes, p. 142.
    L. pinnate. Fruit a woody capsule. Schrebera, p. 142.
B. Corolla small, lobes valvate. Fruit a drupe ... ... Linociera, p. 143.

322. Jasminum arborescens, *Roxb.* Jagkahi, *Chh.;* Amjin, *Bhunia.*

A woody climber, or sometimes sub-erect with trunk attaining 2 ft girth and long drooping branches. Leaves and cymes pubescent, or nearly glabrous in fruit. L. simple, opposite, 1·5—3″ at the time of flowering, attaining 5 by 3·5″ (sometimes even 7″), mostly acuminate. Petiole ·25—·3″ in fls. or attaining ·75″ in age Fls. white, in lax 7 (rarely 3—5)-flowered 3-chotomous cymes. Calyx lobes linear ·06—·12″ (or ·19″ in fruit). Corolla tube 5″, lobes ·5—·6″. Ripe carpel ·5″ black oblong or ellipsoid.

Fls. *Apr.—May.* Fr. *June—July.* New shoots *Mar.—Apr.*

Not uncommon in the moister forests, especially near nalas and rocks. In all districts.

323. Jasminum auriculatum, *Vahl.* Sanmogra, *Mar.;* Jaibelhi, *H.*

A woody climber with ovate or cordate leaves ·5—2″ long, obtuse, mucronate, tomentose when young, pubescent when old. The leaves are really compound, but the lateral leaflets are usually absent or reduced to ovate auricles; they may, however, attain ·3″. Petioles (including rachis of compound leaves) ·8—·2″. Fls. white ·3—·4″ diam. in close short panicles. Calyx-lobes united or free portion only ·04″ long. Fr. globose ·25″ diam., seated on the slightly enlarged calyx.

Fls. *July—Sep.* Fr. *Dec.*

On sandstone, S. Chanda, frequent.

Var. **glabrior.**

Leaves a darker green, glabrous or puberulous, even when young, ·3—1·5″. S. Chanda (Dhaba).

824. Nyctanthes Arbor-tristis, *L.* Harsinghar, Karasli, Sephalika *H.*; Khursi, *Gondi*, *Tel.*

A small tree with weeping 4-angular branches, very scabrous ovate, entire or toothed, acute simple leaves and white salver-shaped fls. with yellow tube in bracteate heads and ample terminal 3-chotomous cymes. Capsule orbicular compressed leathery 2-celled.

Fls. *Sep.—Oct.* Fr. *Dec.—Feb.* Deciduous *Apr.—May.*

Frequent on rocky hills and in second-growth forest, and often gregarious. All districts.

825. Schrebera swietenioides, *Roxb.* Mokha, *H.*, *Mar.*; Ghanta, *Chh.*; Mokhaim, *Tel.*

A moderate-sized tree with opp. imparipinnate leaves with 3—7 leaflets 3—5″ by 2—3″ oblong to ovate-lanceolate, pale beneath, lateral narrowed into a very short petiolule. Fls. ·5—·6″

diam. with minute brown scales in terminal 2—3-chotomous cymose panicles. Capsules 2·5 by 1″ pyriform with small warts, 2—4 angular seeds in each cell.

Fls. *May—June* with the young leaves. Fr. *Oct.—Mar.* Deciduous *Feb.—Mar.*

Common in all districts. Poles used for building.

826. Linociera intermedia, *Wright.* Kunrwan, *Chh.*; Dili, *Tel.*

A small glabrous tree attaining 3 ft. girth with narrowly elliptic-oblong to ell.-obovate leaves 3·5—8″ by 1·25—3″ and axillary pyramidal panicles 1·5—4″ long of small white fls. in sub-sessile clusters on the opposite branches. Drupes ·5″ long purple-black.

Fls. *Feb.—Mar.* Fr. ripening the following *Feb.—Mar.* Evergreen. Renews leaves *Feb.*

Raipur, common in some of the nalas of Singpur and Sihawa; South Chanda and Aheri, in deep nalas.

XLV.—APOCYNACEÆ.

A. Anthers not adhering to the stigma.		
I.—Ovary 2-selled. Fr, a berry or drupe.		
Spinous shrub. L. opposite ...	Carissa,	p. 144.
Large garden shrub Fls. large yellow. L. alt.	Thevetia,	
II.—Ovary of 2 distinct carpels united by the style. Fr. of free follicles.		
Large garden shrub or small tree L. alt.	Plumeria,	p. 145.

Trees or shrubs with whorled leaves ... ... Alstonia, p. 145.
Tree or shrub with opp leaves ... Holarrhena, p. 146.

B. Anthers adhering to the stigma by a point on the connective. Ovary of two distinct carpels united by the style Fr. of free or connate follicles.

I.—Mouth of corolla with scales (or five glands in Tabernæmontana).
(a) Anthers exserted. Small trees. Wrightia, p. 147.
(b) Anthers included. Erect garden shrubs.
L whorled, linear ... Nerium, p. 148.
L. opp. or 3-nate, broad ... Tabernæmontana, p. 148.

II.—*Mouth of corolla without scales.* Climbing shrubs.
(*a*) Anthers *exserted. Fls.* ·5—·6″ diam. f.. ... Vallaris, p. 148.
(*b*) Anthers included.
Petals with inflexed tips. Cymes pubescent .. Ichnocarpus, p. 149.
Petals without inflexed tips. Cymes glabrous .. Anodendron, p. 148.

327. Carissa spinarum, *A. DC.* Jangli Tondi, *Mar.;* Karaunda, *H.*

An erect, often bushy shrub armed with long usually forked spines 1—2″ long. L. opp., entire ·5—1·5″ pale beneath mostly acute and apiculate glabrous. Fls. small white star-like ·25—·3″ diam. with tube ·25″ long or rather larger in 3-chotomous cymes. Sepals subulate acuminate. Berry ·25″ diam. sub-globose.

Fls. *Mar.—May.* Fr. *Nov.—Dec.* Evergreen.

Not very common, chiefly on sandy soils. Alesur Block (Bh); Kurmur, Niwas, etc., on Baihar plateau (Bal.); N Chanda.

The fruit is edible.

328. Carissa Carandas, *L.* Karaunda, Kati Kandhori, *H.*

An erect or large spreading and sarmentose shrub with large straight single or 3-fid. thorns, ovate or ell. or oblong shining leaves 1 5—3′ long very short petioles and terminal puberulous sessile or peduncled cymes. Calyx pubescent, corolla tube ·5—·75″. Berry 5—1″.

Fls. *Mar.—Apr.*

Cultivated. The large sarmentose form near Telenkheri (Nagpur) comes very close to suavissima, *Bedd*, but the calyx seems more pubescent and less acuminate, leaves less acute, and the *thorns* are *straight*.

329. Plumeria acutifolia, *Poiret.* Champa, *H.*, is a small tree often grown in gardens. It has round very thick branches and large cream and yellow fls in 2—3-chotomous cymes. Deciduous in the hot weather.

330. Alstonia venenata, *Brown.* Var. pubescens.

A shrub with pubescent branchlets, lanceolate whorled leaves 3—5″ long and terminal corymbose panicles of salver-shaped fls. with slender tube ·75″ long and petals ·5″ long. Fruit of two slender follicles. The leaves have numerous regular parallel spreading sec nerves, and there are several linear-subulate glands between the petioles.

Fls. *July.* Fr. not seen (in C. P.).

Found by Mr. Donald in Allapalli and on cliffs in Sironcha. The plant was named at first 'neriifolia,' *Don*, between which species and 'venenata' it is intermediate. If, however, the two species are reduced to one, as has already been suggested by Sir D. Brandis in a note at Kew, then 'venenata' is the older name.

331. Alstonia scholaris, *Brown.* Chatwan, *H.*

A tree with whorled quite glabrous leaves, 4—7 in a whorl, 4—8′ long and large umbellate paniculate cymes of greenish-white fls.

Fls. *Nov.—Dec.* Fr. *r. s.* Evergreen

Not wild in the circle but often planted. The climate is generally too dry for it and it never grows well.

332. Holarrhena antidysenterica, *Wall.* Kura, *H.*; Indarjhao (the seeds), *H.*; Kudla, *Mar.*; Samoka, *Gondi*; Guda pala, *Tel.*

A large shrub or small tree with glabrous or pubescent sub-distichously spreading sub-sessile ovate to ell.-oblong leaves 6—12″ by 1·5—5″ strongly nerved (8—15 prs.) beneath and terminal corymbose cymes of sweet-scented white fls., ·75—1·5″ diam.

Stamens not exserted. Fruit of two slender divergent follicles 6—9″ long by about ·16″ broad.

Fls. *Apr.—July.* Fr. *Dec.—Feb.* It is deciduous in the hot season and fls. on the new young shoots.

In all divisions, especially in the damper localities, but the pubescent form is common on Ramtek Hill (N. W.); often in waste ground.

An excellent cure for chronic dysentery.

The pubescent form appears to be the more common.

333. Wrightia tinctoria, *R. Br.*

A small usually pubescent tree with sub-sessile elliptic-oblong to oblanceolate leaves 4—10″ long (always quite small when in flower) and corymbose cymes of pretty white flowers, ·5—·5″ diam. conspicuous for their corona of linear scales and exserted cone of yellow anthers. The leaves have always a sudden short acumination, the young ones dry more or less blue, with reddish veins beneath. Follicles 10—20″ long, always curved and cohering at the tip until nearly ripe.

Fls. with the very young new leaves, *Mar.—May.*

Usually on dry sandy soils and hills.

Partabgarh hills Bhandara ; N and S. Chanda, *frequent*; Laon range (Rai ; Na; Wardha Southern specimens are all pubescent, but I collected a glabrous form from the Pachmarhi Hills.

334. Wrightia tomentosa, *Roem. Sch.*

Pailari, *Gondi ;* Kala Indarjhao, *H. ;* Pandu Kura, *Mar. ;* Tela Pala, *Tel.*

A small tree with yellowish or milky juice, slender, pubescent branches and distichous, elliptic shortly caudate tomentose leaves 3—5″ long with 8—14 prs. strong sec. nerves. Fls. 1″ greenish-orange or cream-coloured with red coronal scales, in tomentose corymbose cymes. Follicles connate into a grooved pendant cylindrical pod about ·5″ thick.

Fls. *Apr.—June.* Fr. *Dec.—Feb.* Deciduous, *Feb.—Mar.*

In valleys, not very common. S. Sibawa (Rai.) ; Dhansua range (Bal.), S. Chanda.

835. Tabernæmontana coronaria, *Willd.* Tagara, Chandni, *Vern.*, is a handsome evergreen shrub, with glossy leaves and white fls. ·5—1″ diam. which are often double. It is commonly grown in gardens and sometimes called a 'Gardenia,' from which it is at once distinguishable by its milky juice, apart from its entirely different floral structure.

836. Vallaris Heynei, *Spreng.* Dudhbel, *Mar.*; Palatige, *Tel.*

A climber with light grey tough cord-like stems, though sometimes found in a semi-shrubby state in open ground. Leaves light green, oblong to elliptic, shortly acuminate, nearly glabrous 1·5—4″, membranous, sometimes pellucid-punctate, with 5—9 prs. arching fine sec. n. Fls. pretty, white, ·5—·75″ diam. with broad roundish spreading petals and exserted stamens. Fr. 6″ by 1·5″ terete, of perfectly united carpels.

Fls. *Apr.—May* (one flowering specimen also labelled *Nov.*). Fr. *Nov.—Jan.*

Balaghat; Deori, near Sheonath river (Raj Nandgaon); S. Chanda 'not uncommon.'—Donald.

337 Nerium odorum, *Soland.* Kaner, *H.*

The Oleander, with whorled narrow leaves, 4—6′ long and beautiful rose or white fls., is extensively cultivated.

338. Anodendron paniculatum, *A. DC.*

A large climber, juice scarcely milky, with stout green stems and large oblong shining strongly pinnate-nerved leaves which attain 10 by 3·25″, pubescent or puberulous beneath with many strong oblique sec. nerves looping within the margin. Uppermost leaves narrow-oblong 4—5″ by 1·5″. Small, pale yellow salver-shaped fls. in very lax slightly branched axillary and terminal brachiate panicles. Follicles 5—6′ long and ·6″ diam. at the base, tapering

Fls. *Mar.—Apr.*

Sironcha range, rare.

339. Ichnocarpus frutescens, *Br.* Dudhi, Dhimar Bel, *H.*; Dudhbel, *Mar.* (name applied to most milky-juiced climbers).

A large rambling or climbing shrub, woody below, with rusty tomentose branchlets, elliptic or broadly-oblong glabrous leaves 1·5 –4″ long, pale beneath, and narrow panicles of small white fls ·3″ diam. with narrow twisted bearded lobes. Panicles usually leafy with short branches Follicles 3—6″ linear divaricate only ·1″ broad.

Fls. *Sep.—Dec.* Fr. *Jan.—Mar.*

Leaves turn brown or reddish in February before falling.

The plant is sometimes confused with *Hemidesmus.* Frequent in hedges, etc.

Panchera (Bal.); S. Chanda: 'common'—Donald; N. Chanda; probably in all divisions.

It is used for tying.

XLVI.—ASCLEPIADACEÆ.

A. Filaments free. Pollinia granular.
  Staminal corona O. Climbers.
 Fls. in lax cymes, small, yellowish... Cryptolepis, p. 151.
 Fls. very small in dense axillary
  cymes, purple ... ... Hemidesmus, p. 150.
 Fls. large, funnel-shaped, purple ... Cryptostegia, p. 152.

B. Filaments connate into a column. Pollinia waxy Anthers with an inflexed membraneus tip.
I.— Erect shrubs. Pollinia pendulous Calotropis, p. 151.
II.— Climbers. Pollinia pendulous.
Corolla salver-shaped ·7″ diam. Pergularia, p. 152.
Corolla rotate 1—1·5″ diam. ... Holostemma, p. 152.
Corolla urceolate ·1″ diam. ... Gymnema, p. 153.
III Climbers. Pollinia erect.
(a) Corona corolline only ... Gymnema, p. 153.
(b) Corona staminal only.
Corolla rotate or campanulate, Fls. green ·2—·6′ ... Marsdenia, p. 153.
Corolla salver-shaped. Fls. yellow over ·7″ ... Telosma, p. 155.
C. Anthers appendiculate but without a membranous tip. Pollinia erect. Corona double, of scales or undulate. Corolla rotate ... ... Leptadenia, p. 156.

340. Hemidesmus indicus, *Br.* Anandmal, *H.*

A slender twining shrub with rather distant opposite prs. of leaves 1—4″ long by ·3—1·5″ broad, most variable in shape, always apiculate, very frequently with a white central streak above and pale beneath; base rounded, sec. n. few. The small fls are clustered in the axils of the leaves and are green outside, purple within. Calyx spreading in fruit and then ·25″ diam. Follicles glabrous divaricate 4—5″ by ·2″.

Fls. *Aug.—Sep.* Fr. *Oct.—Dec.* Evergreen.

Very frequent, both in forests and hedges in all divisions. Used in Hindu medicine to relieve fever, also for skin-diseases.

Var. pubescens. Branches and leaves pubescent.

Nagpur, Raipur, Bil., N. Chanda.

Var. reflexus. Follicles up to 7″ strongly reflexed, seeds ·25″ long. L. up to 4″ by 2″ pubescent

Sangarhi (Bh.) ; Dokal (Rai.).

841. Cryptolepis Buchanani, *Roem* Bokharia, *Gondi ;* Kala Bel, *H.* (*f.* Donald).

A large twining shrub with glabrous, oblong or elliptic entire leaves 3·5 - 4·5″, shining above and white glaucous beneath, and axillary 2-chotomous cymes of pale yellow fls. Corolla tube 1″, lobes ·3″. Follicles 2·5—4″ long by ·5—·75″ diam.

Fls. *May—June.* Fr. *Dec.—Feb.* Evergreen.

Common in valleys in all divisions.

842. Calotropis gigantea, *R. Br.* Madar, *H.;* Akan, Ak, Rui, *Mar.;* Jelleda, *Tel.*

A stout white-tomentose shrub (occasionally a small tree with trunk 12″ girth), with large more or less obovate-oblong leaves 4—8″ long, narrowed to a cordate, often amplexicaul base and handsome reddish light purple or lilac flowers 1 - 1·5″ diam. with spreading petals. Follicles 3″ by 1·5″, recurved obtuse.

Fls. *Dec.—July.* Fr. *Feb.—June.* Evergreen.

In open waste ground, general.

843. Calotropis procera, *R. Br.* Vern names as in the last.

A shrub 3—4 ft., closely resembling the Leaves usually suddenly often sharply acu sub-mucronate, old, glabrous beneath. Fls.

erect petals which are white with a deep purple blotch within.

Fls. chiefly *Dec.—Feb.*

344. Cryptostegia grandiflora, *Br.*

A scrambling glabrous shrub with elliptic-obtuse coriaceous shining leaves 3—4" long and large, light purple funnel-shaped fls. 1·5—2" diam.

Very commonly cultivated in gardens and semi-wild about Nagpur.

345 Pergularia extensa, *N. E. Br.* (Syn. Daemia extensa, *Br.* in F. B. I. and 'Forest Trees.'). Uteran, *Mar.*

A slender sub-hispidly hairy or glabrate fœtid climber with membranous orbicular or broadly ovate, deeply cordate acuminate leaves 2—4" long and broad, and green, or yellowish-green, and red salver-shaped fls ·6—·7" diam., in long-stalked corymbose drooping panicles. Follicles 1·5—2" lanceolate with long soft spines.

Fls. *Oct.—Dec.* Fr. *Dec.—Jan.*

Very common in village hedges. Nagpur, Bhandara, Balaghat and found in all divisions.

NOTE—This plant belongs to the genus Pergularia of Linnæus, *not* the genus Pergularia as defined in the F. B. I., *vide* Coville in "The Useful Plants of the Island of Guam," published 1905, in the U. S Nat Harb IX, 384, and N N E. Brown in Kew *Bulletin*, 1907, p 323

346 Holostemma Rheedei, *Wall.* Jaganthi Jhuti, *Mar*

A twining glabrous or puberulous shrub with obtusely triangular ovate or oblong-ovate cordate leaves 3—6″ long, the large basal lobes often incurved Fls. 1—1·5″ diam., purple and white with cup-shaped corona. Follicles short thick curved.

Fls *July—Sep.* Fr. *Jan.*

Nagpur 'Eaten as a vegetable'—(Graham).

347. Gymnema sylvestre, *Br.*

A rather slender woody climber with densely hairy branchlets (the hairs inclined forwards) and broadly elliptic to oblong, acute or somewhat cuspidate or obtuse leaves 1·5″—2·25″ long in flr., 2·5—3′ long by 1·3—1·5″ broad when mature, somewhat pubescent both sides esp. on the nerves beneath, base rounded or sub-cordate. Sec. n. 3—5 each side Petiole ·25—·3″ Fls. 1″ diam. yellow in axillary umbels not much longer than the petiole, hairy. Corolla urceolate with spreading lobes with villous ridges on the tube, the points of which just project above the sinuses. The minute pollinia are usually erect in the genus but they may be horizontal or pendulous in this species! Follicles 2—2·5″ slender poniard-shaped.

Fls. *Sep.* Fr. *Dec.*

South Chanda and South Sihawa (Raipur).

Enquiries have been made for this plant, but it is very scarce in the Southern Circle The root is held in repute as a remedy for snake-bite The leaves contain a glucoside 'Gym [illegible]-acid,' and when chewed deaden the sense of taste (see "Plants and Drugs").

348. Marsdenia Hamiltonii, *Wight.*

Sub-erect when flowering, ultimately climbing from a very stout perennial rootstock

L. 1·5—2·75″ at the time of flowering, ovate or broadly oblong shortly, sometimes obtusely, acuminate mostly with cordate base, puberulous above, furfuraceously pubescent on the nerves beneath (nearly glabrous in the type). Sec. nerves 4—5 each side, nervules strong and raised beneath. Cymes corymbose bifurcate dense on very short peduncles, pubescent. Fl. campanulate ·15″ diam., with densely villous throat. Stamens with very slender subulate appendage or back of anther.

Fls. *Apr.—May.*

Topla (Bal); Mandla-Bilaspur boundary line (Bil.).

The fruit is not known and should be looked for. It is said to be eaten.

849. Marsdenia tenacissima, *W. & A.*
Marwat, *Mar.;* Chinhaur, *Gondi.*

A stout, very tough-stemmed twiner with very milky juice, stems attaining ·5″ diam. and persistently pubescent. L. velvety to touch both sides, tomentose when young and persistently on the nerves, broadly ovate, suddenly shortly acuminate or cuspidate, adult 4—7″ by 3—5″, with deeply cordate or lobed base. Petiole 1·5—3″. Fls. green, ·3″ diam sub-campanulate with spreading lobes, corymbose, in much branched cymes which are sessile or very shortly pedunculate. Follicles 5″ long by 1·25″ thick (thickest part about one-third way up) obtuse, grooved on one side, especially above towards a short thick beak, velvety, very milky.

Fls. *Apr.—June.* Fr. *Nov.—Feb*

Not very common Baloda-Dhamtari sandstones (Rai.); Haveli range (N. Ch.)?

Yields an excellent fibre.

350. Marsdenia volubilis, *Cooke.* (Syn. Dregea volubilis, *Benth.*, in F. B. I. and "Forest Trees.") Bandegurji, *Tel.;* Ikdodi, *Mar.*

A stout twiner with stems attaining 1″ diam., somewhat corky reticulate bark and pale, very lenticellate twigs, ovate or broadly-ovate leaves, more or less acuminate, usually hoary with a fine curled pubescence, 2·5—6″ or 7″ long, usually with a number of small subulate glands at the base of midrib above, base rounded rarely cordate, sometimes acute and unequal. Fls. green rotate, or sub-campanulate when old, ·5—·6″ diam. in dense drooping usually branched umbels. Peduncles 1—3″ becoming woody in fruit. Pedicels ·5—1″. Petals broadly oblong or ovate obtuse Follicles 3—4″ by 1—1·5″ diam., single or paired on the long woody peduncles and pedicels.

Fls. *May—June.* Fr. *Dec.—Feb.*

Common in valleys, Bazargaon block, Magardokra forest and Girur (Nagpur Wardha); N. and S. Chanda; and probably in all divisions.

Its juice is milky, but I suspect that this somewhat depends upon the season, specimens collected in December had sub-watery juice The rind of the fruit is used as a vegetable.

351. Telosma pallida, *Craib.* (in contrib. to "Flora of Siam"). Syn. Pergularia pallida, *W. & A.* in F. B. I., "Indian Trees," etc. Marwat, Ikdori, *Mar.*

A strong twiner with *sub-watery* juice, stems somewhat furrowed and pustular, glabrous when old, ovate or ovate-cordate shortly cuspidate leaves 2—5″ long, on slender petioles ·75—2″ long. Old usually deeply cordate with nerves beneath shortly pubescent, but otherwise glabrous. Fls. greenish or yellowish-white ·75—1″ diam. with distinct tube, in axillary umbelliform cymes on very short peduncles. Follicles usually solitary, very smooth with thin shell 3—4″ long, thickest about the base, tapering rather suddenly, on woody pedicels ·3—·5″ and peduncles never exceeding 1″.

Fls. *May.* Fr. *Nov.—Jan.* Renews leaves at the time of flowering.

I have no specimens from the Southern Circle, but it occurs in Western Bengal, Canara, Mysore, U. P., and Bombay, and therefore likely to be found.

S. Chanda (J, Donald).

(For alteration of the generic name of this plant see loc. cit. under *Pergularia extensa*)

352. Leptadenia reticulata. *W. & A.* Bhuidodi, *Mar.*

A twining shrub with corky bark and slender branches. Young leaves oblong-lanceolate hoary, older ovate 2—3″, thinly pubescent or glabrous. Fls. ·2″ diam., green or yellow, rotate, pubescent in umbels ·75—1″ across. Follicles 2·5—3″.

Fls. *May—July.* Fr. *Feb.*

Nagpur.

Graham says that the plant is used for reducing copper.

XLVII.—LOGANIACEÆ.

353. Strychnos Nux-vomica, *L.* Kuchale, *H.;* Bibtamupti Chetu, *Tel.*

A m.-s or large handsome tree with ovate or sub-orbicular shining leaves 2—4″ long with three strong and two weaker nerves from near the base and petiole ·3—·5″ long. Fls. white tubular, with short lobes, in short peduncled cymes mostly at the ends of the short branchlets. Fr. globose, bright orange 1—2″ diam. The discoid satiny seeds are surrounded by a white intensely bitter pulp.

Fls. *Mar.—Apr.* Fr. *Dec.—Jan.* Evergreen.

Laon range on quartzite plateau (Rai); Tumnur and Marigudam forests (S. Chanda); Ahiri. Chiefly on deep alluvial soils.

A well-known source of strychnine.

354. Strychnos potatorum, *L. f.* Nirmali, *H.;* Kahur, Kahi, *Mar.;* Chilla, *Tel.* The Clearing Nut.

A small branched tree with blackish cracked bark, elliptic or ovate leaves 1·5—3″ long, nervation often much as in the last (sometimes sub penninerved), but easily recognised by the petiole being under ·2″. Fls., white with the corolla tube only ·12—·17″ long in numerous lateral cymes. Fr. globose ·5—·7″ with firm pericarp, thin pulp and often only one large thickly lenticular seed ·4—·5″.

Fls. *May.* Fr. *Oct.—Feb.* Evergreen.

Common in Nag. War., Bhandara and N. Chanda, also found in S. Chanda, Bal., Rai., and rarely in Bilaspur.

The seeds (Kawi) rubbed in water to a pulp are used for sore-eyes. They are also used for clearing muddy water.

XLVIII—GENTIANACEÆ.

855. Swertia angustifolia, *Ham.* Var. pulchella, *Burkill.* Chiretta, *H*; Chirainta, *Baiga.*

A pretty herb 2—3 ft. high, with weak 4-angled stems, sessile lanceolate, 3-nerved leaves 2·5—3·5" long and numerous fls., both solitary axillary and in terminal cymes, the whole forming long leafy panicles. The fls are white with lilac veins and blue dots, petals 4, ·3" long with the gland at the base covered by a large scale.

Fls. *Nov.—Jan.*

Grassy glades. Dhamtari, Singpur and Sihoa (Raipur); Paraswara forest (Bal)

An infusion of this plant is used for fever and as a stomachic.

856. Enicostema littorale, *Blume.* Nai, *Mar.*

A pale glaucous herb with sessile-oblong or linear-oblong leaves and axillary clusters of small white flowers in sessile clusters. Corolla tubular funnel-shaped with five lobes.

Fls. *r. s.*

Common on cotton soil and trap rock. Said to be a cure for snake-bite and scorpion sting. Mr Rogers also sent a specimen from Berar, where it is similarly used. It was tried on myself for scorpion sting without effect.

XLIX.—BORAGINACEÆ.

Calyx shortly 4—8-lobed. Style twice 2 partite	Cordia.
Calyx small sub-5-partite. Style 2-fid ...	Ehretia, p. 161.
Calyx 5-partite. Style undivided. Stigma 2-lobed	Rhabdia, p. 162.

Key to Cordia.

L. 2—5·5″ rarely ovate, base cuneate. Cymes short peduncled	Myxa.
L. 5—8″ ovate, base rounded or sub-cordate, not tomentose...	latifolia.
L. as in Myxa but tomentose beneath. (Cymes long peduncled ?)	Wallichii.
L. broadly ovate, entire, cordate 5—8″, white tomentose beneath	Macleodii.

357. Cordia Myxa, *L.* Lasura, *H.;* Bokar, *Mar.;* Virki, *Gondi;* Iriki, *Tel.;* Shelu, *Mar.*

A small or m.-s. crooked tree with often drooping branches, brown bark with shallow wrinkles and furrows. Innovations densely fulvous, somewhat stellately pubescent and with longer hairs. L. 3—6-nerved at the base, orbicular elliptic, oblong or *typically* obovate, with cuneate base 2—5·5″, usually repand-dentate, old glabrous except in the axils of the nerves beneath, smooth above to the naked eye, but under the lens marked with small white dots, sec. n. about 4 prs. distinct, tertiaries scalariform, but not quite straight, very reticulate between. Petiole ·75—1·2″ usually rather slender. Fls. in numerous irregular or sub-corymbose cymes 2—4″ diam., white. Fr. conical when young, old ·5—·75″ shining yellow with very viscous pulp, one-seeded, seated on the enlarged saucer-shaped calyx which is ·5—·75″ diam.

Fls. *Mar.—Apr.* Fr. *June—Aug.*

Chiefly along nalas, in all divisions, but not very common.

The wood does not appear to be much used except as a fuel. The fruit is eaten.

[NOTE.— I have described the typical Cordia Myxa above, as there is much confusion in the species. Brandis (*Indian Trees*,

p. 478) states that the cystolith cells are not conspicuous on the upper surface of the leaves. This is true of the type which has, however, scattered and grouped discs as well as the white dots.]

Var. (C. obliqua of F. B. I., not of Willdenow ?) L. puberulous beneath entire not cordate with cystolith cells conspicuous as raised discs on the upper surface. (*Vide* Brandis' *Indian Trees*, p. 478.) Cymes short dichotomous. Calyx tubular campanulate, regularly lobed.

Sijhora (Bal.) on plateau.

358. Cordia latifolia, *Roxb.* Bara Lasura, *H.*

Leaves large attaining 8 by 5·5″ ovate with rounded or sub-cordate base puberulous between the straight prominent tertiary nerves beneath. Discs present on the upper surface of leaves but not distinctly raised.

Sonawani Hills (Bal.); Panchgaon Block (S. Ch.) ?—Donald.

[NOTE.—This is called Cordia obliqua (?) in "Flora of Chota Nagpur," but I have since seen a type leaf of Willdenow's *Cordia obliqua*, and it hardly seems the same. The tree is, however, quite different from ordinary C. Myxa. Donald remarked that this plant looks like a glabrous form of Cordia Macleodii. Willdenow describes C. obliqua as with leaves *sub-rotund-cordate and oblique, differing from Myxa by its* quite entire leaves never repand-dentate and by the calyx not being striate. But Cordia Myxa is wrongly described as with striate calyx. The type leaf of Willdenow's C. obliqua is shallowly cordate, 5-nerved at base with 3 sec. n above base tertiary nerves as in Myxa, and nervules very reticulate raised beneath, undersurface uniformly thinly pubescent

Cordia obliqua, with its so-called variety Wallichii, at Kew, appears to me a heterogeneous assemblage of forms and it even contains a nearly typical form of C. Myxa.]

359. Cordia Wallichii, *G. Don.*

"A middle-sized tree, leaves entire or nearly so, densely and softly tomentose beneath with stellate hairs, otherwise similar to C. Myxa."—Brandis.

Not common. Mircul (S Chanda).—Donald.

[NOTE.—I have not seen Mr Donald's specimen. If it only differs as stated, it would appear to be a mere variety of C Myxa, but I think it may be also distinguished by its very long peduncled cymes and often broadly ovate sub cordate leaves It is probably Beddome's *Cordia Wallichii* Fl Sylv. t. 245) and Wight's *Cordia obliqua* Ic. t 1378, but Don's *C. Wallichii* = Wallich's *Cordia tomentosa* No. 897, a Nepalese plant, and doubtfully the same.]

The whole group requires further study in the field, specimens being collected from the same individuals in different stages of growth.

360. Cordia Macleodii, *Hook. f. & Thom.* Daigan, *H.*; Daiwas, *Mar.*; Boku, *Tel.*

A small or m.-s. tree with light grey bark. Blaze pale turning brown. Twigs, leaves beneath, and inflorescence covered with a white-felted or tawny tomentum. L. broadly ovate, entire, often deeply cordate obtuse or very shortly acuminate 4—8″ or even 10″ long. Petioles 1·5—3″. Discs on the upper surface close numerous. Fls. white in dense extra-axillary or leaf opposed corymbs. Fr. very acuminate when young, globose apiculate ·75″ and yellowish somewhat tomentose when ripe.

Fls *Mar.—Apr.* Fr. *May—June.* Nearly evergreen.

Frequent in all divisions. Wood used for implements. It is "light brown, beautifully even-grained and very hard."—Gamble

361. Ehretia lævis, *Roxb.* Datranga, *H.*; Dokke, *Gondi*; Reda paladante, *Tel.*

A small or m.-s. tree with pale grey or white bark. Blaze white with small brown streaks, turning deep brown. L. ovate, ell. or ell.-oblong rarely obovate, entire, usually with small tufts of hair in the axils of the 5 - 6 prs. sec. n. beneath, base usually cuneate on the petiole. Fls white sessile ·3—4″ diam. in dichotomous scorpioid cymes 2—4″ diam. Fr. a sub-globose black drupe with 1—4 one-seeded pyrenes.

Fls. *Feb.—Mar.* Fr. *Mar.—Apr.* Deciduous *Feb.* or *Mar.*

Frequent, chiefly near river-beds on gravel, *e.g.*, Bawanthari river, N. W and Bhandara ; S Chanda, common ; Bal. Wood not used. L used for fodder. Fr. eaten.

362. Ehretia microphylla, *Lamk.* (Syn. Ehretia buxifolia, *Roxb.*).

A twiggy shrub, 3—5 ft. with drooping minutely strigose branches. L solitary and fascicled on abbreviated shoots, ·25—1 25″ long, very dark green shining and hispidulous above, pale beneath, obovate or obovate-lanceolate narrowed into a very short hispid ·05″ petiole, apex rounded usually 3—5-toothed. Fls. one-sexual white ·25′ diam on slender terminal peduncles ·02—·3″ long which are sometimes 2-flowered. Fr. globose ·2″ diam. with deeply 2-fid. style, drupaceous, with 4 one-seeded cells.

Fls. *Oct.* Fr. *Nov.*

In undergrowth; dry forests of the Umrer range (Bori Majra), N. Wardha.

363. Rhabdia lycioides, *Mart.*

A shrub 2—4 ft. with very tough erect, or prostrate and rooting branches, linear or oblong-oblanceolate leaves ·5—1·25″ long and small pink fls. ·25—·5″ diam., usually 2—3 at the ends of the short lateral branchlets. Drupe orange-red.

Fls. *Oct.—Jan.* Fr. *Dec.—Feb* Evergreen.

In rocky river-beds in all divisions.

L.—CONVOLVULACEÆ.

A. Climbing shrubs. Ovary 1-celled. Fr. baccate 1-seeded	Erycibe,	p. 163.
B. Climbers. Stigmas linear-oblong Ovary 4-celled	Rivea,	p. 164.
C Climbers. Stigmas 2, globose.		
I —Fr. indehiscent.		
Ovary 2-celled	Lettsomia,	p. 164.
Ovary 4-celled	Argyreia,	p. 164.
II.—Fr. dehiscent	Ipomæa,	p. 165 & 166.
D. Leafless parasites	Cuscuta,	p. 165.

364. Erycibe paniculata, *Roxb.* Kaka beli, *Gondi ;* Kati tige, *Tel.*

A large climbing shrub with conical protuberances on the trunk, rusty tomentose shoots, entire oblong, rarely oblanceolate or obovate abruptly acuminate leaves about 5″ by 1·5″ and terminal rusty cymose panicles of yellowish-white fls. ·5″ diam. with crisped petals. Berry black, ·6″ long, with dark-purple flesh, seated on the spreading persistent calyx.

Fls. *Apr.—June.* Fr. ripens following *May.* Evergreen.

Valleys, near nalas. Lormi and Pantora forests (Bil.) ; Mukri, Garangi (S. Ch.) ; Maramsilli (Rai.)

The fruit is eaten.

Var. Wightiana. L. ell. cuneately acuminate at both ends or lanceolate. Fls. white, sweet-scented.

"South Chanda Fls Nov."—Donald.

365. Rivea hypocrateriformis, *Chois.*

A climber with silky stems, orbicular-cordate cuspidate leaves 2-3·5″ diam., white with appressed silky hairs beneath, and long-tubed white fls., 2″ diam. Capsule sub-globose apiculate ·6″ diam, seated on the 1″ diam calyx, breaks up transversely a little above the base.

Fls. *Aug.—Sep.* Fr. *Nov.—Dec.*

Common, especially in scrub jungles.

366. Argyreia sericea, *Dalz.*

A large twiner with roughly hairy or villose and strigose stems and ovate-cordate leaves which are beautifully silvery silky beneath and hairy above, especially when young. Petiole 1·5-2″. Fls. pink tubular funnel-shaped 1·5″ long (—2·5″ F.B.I.) in capitate few-flowered cymes with an involucre of leafy ovate to ovate-lanceolate bracts and bracteoles and peduncles 1·5—3″ long. Berry ·25—·5″ diam yellow.

Fls. *July—Sep.* Fr. *Oct.—Nov.*

Frequent Nagpur Wardha; N. and S. Chanda.

367. Lettsomia setosa, *Roxb.* Bagchaur, *Gondi;* Masbel, Maswel, *Mar.*

A strong twiner with milky juice, strigose stems up to ·25″ diam. ovate or narrowly-ovate, cordate leaves up to 7″ by 6″ with shortly cuspidate or somewhat acuminate tip, thinly strigose beneath, squamate or microscopically pitted (after fall of the scales) above. Petiole 2—6". Flowers in corymbose cymes, pale pink-purple about 1·5" long and broad, somewhat curved, with declinate stamens Bracts orbicular. Peduncles 3—7". Berry ovoid red.

Fls. *Nov.—Dec.* Fr. *Dec.—Feb.*

Kolsa (N.-Ch.); Ghatula, etc (Raipur), frequent; Elgur, etc. (S. Ch); probably in all divisions.

868. Ipomæa Turpethum, *Br.* (Syn. Operculina Turpethum, *Manso*).

An extensive climber with 3—4-narrowly-winged stems, ovate cordate, acuminate or acute, glabrous or pubescent leaves 3—8' long and many 2—5-fld. cymes of white fls. 1·5—2" diam. Sepals ell.-oblong at first, ultimately calyx inflated with orbicular concave sepals 1" long in fr.; Endocarp of fr. quite transparent

Fls. *Oct.—Jan.* Fr. *Dec—Mar.*

Frequent Bhandara; N. Chanda; S. Chanda; Bhainsajhar (Bil.).

869. Ipomæa muricata, *Jacq.*

A twiner with tough muricate stems, cordate-ovate glabrous leaves and rose purple fls. 2—2·5" diam. The peduncle is much swollen above in fr.

Fls. *Sep.—Nov.* Fr. *Dec.—Jan.*

Elgur (South Chanda).

870. Cuscuta reflexa, *Roxb.* Amarbel, *H.*, is a parasitic herb consisting of a number of yellow fleshy threads attaching itself by means of 'haustoria' to its host plant—usually species of *Zizyphus* and Babul. It is liable to be confused with another plant of similar habit, *Cassytha filiformis*, from which it may be distinguished by its yellow green colour (the Cassytha is blue-green) and the convolvulus-like structure of the small white flowers.

Found in all divisions except in South Chanda.

There are numerous other unimportant climbers belonging to this family.

871. Ipomæa Batatas, Shakarkand, *Vern.;* the sweet potato is cultivated in the sandy beds of the rivers.

LI.—BIGNONIACEÆ

A. L. 1-pinnate (or some leaves sub-2-pinnate in Dolichandrone).	
Fls sub-regular in few fld. racemes. Calyx spathaceous	Dolichandrone, p. 167.
Fls sub-regular in many fld. close panicles. Calyx 3—5-lobed ...	Heterophragma, p. 168.
Fls irregular in lax panicles. Calyx shortly 3—5-lobed	Stereospermum, p. 169.
B. L. 2-pinnate or 2—3-pinnate.	
Fls. 1 3—2′ diam. in erect panicles. St. 4	Stereospermum (xylocarpum), p. 171.
Fls. 1″ diam. (with tube 2—3″), drooping in *inclined* panicles. St. 4 ...	Millingtonia, p. 167.
Fls. in long erect racemes. St. 5 ...	Oroxylum, p. 167.

372. Millingtonia hortensis, *L. f.* The Indian Cork Tree.

A tall somewhat shallowly rooted tree, much grown in avenues and gardens, with pretty bipinnate leaves and panicles of pendant white long-tubed fragrant flowers.

Fls. *Oct.—Dec.*

373. Oroxylum indicum, *Vent.* Tantu, *Mar.*; Dudilam, *Tel.*; Jai Mangal, *Gondi.*

A small tree with soft thin bark and pale yellowish-green blaze, few branches, and terminal clusters of very large ternately 2—3-pinnate leaves, 2—4 ft. long and broad, leaflets about 5″ by 3″ acuminate. Fls large fleshy, dark-purple in terminal stout racemes. The tree is easily recognised when leafless by the large leaf scars and immense flat capsules 1—3 ft. long.

Fls. *July—Aug.* Fr. *Dec.—Mar.* Deciduous *Dec.—June.*

Moist and rocky valleys. Kaia (Bal.); Sitanadi, Sihoa forests (Rai ; S Ch.; nowhere common.

Believed not to be used in the Southern Circle, but Witt says the "bark and fruit used for tanning" in Berar.

374. Dolichandrone falcata, *Seem.* Merdsingh, Mersingh, *Mar.*; Udda, *Tel.*

A small or m.-s. hoary pubescent tree with grey bark exfoliating in irregular scales. L. pinnate or sub-2-pinnate, the secondary rachis nearly obsolete (so that the leaflets appear to start from a node of the main rachis. The pedicel of the third leaflet is, however, longer), rachis 2—5″ with usually 5—7 or, in 2-pinnate leaves, up to 13 leaflets.

Leaflets ·5—2·5″ sometimes retuse or shortly cuspidate Petiolule (except in terminal leaflets) 0—·1″. Fls pretty, white, 2″ diam. with tube 1·5″ long, dilated above, in short few fld. corymbose racemes, petals crisped. Pod 12—18″ long, curved compressed.

Fls. *Apr.—June* (also occasionally in *Nov.*).

Common in the western divisions, rare in the Sal forests. Frequent on cotton soil Beddome says that the wood is used for building and agricultural purposes.

375. Heterophragma Roxburghii, *DC.* Paiang, *H.;* Bondua Mara, *Gondi;* Warsi, *Mar.;* Bondgu, *Tel.*

A large tree attaining 7—8 ft. girth with very stout twigs marked with opp. leaf-scars. Bark very rugose, thick with brown and yellow blaze, rather soft. L pinnate 10—18 with 5—9 ell. or oblong (or terminal ovate) leaflets 2·5—8″ mature glabrous, usually shortly suddenly acuminate or point, obtuse, rarely acuminate, base on the lower side decurrent on the petiole, margin crenate-serrate or sub-entire, sec. n 3—5. Petiolules 0—·2. Fls. large 1·5—2 white or pinkish, in close terminal tomentose panicles 6′ long. Calyx ·75′ mostly 2-lipped, sometimes lips lobed. Lobes of the corolla crisped, pink. Capsule purple-brown 8—12, stout straight oblong 4-celled.

Fls. *Dec.—Jan.* Fr. *Apr.—May.*

Valleys Frequent in South Chanda forests, especially Allapalli and Markhanda ranges near the hills; Aikala (N. Chanda).

876. Stereospermum chelonoides. *DC.* Chota Padar, *H.*; Lahan Palang or Parad, *Mar.*; Pandri, Pindri, *Gond.*

A tree, rarely large in the C. P., with nearly smooth grey bark. Blaze thick pale, yellow zoned, with hard and soft layers. Leaves clustered towards the ends of the twigs 6—15″ long. Lflts. 7—11, 3—5″ elliptic caudate, glabrous, entire or somewhat serrate, sec. n. 4—10 prs. Petiolules ·3—·5″ Fls. fragrant in lax drooping terminal panicles with articulate slender branches. Calyx ·25″ purple glabrous Corolla ·75″ yellow and purple with purple veins, villous inside anteriorly. Pod 9—20″, somewhat curved or spiral, 4-angled or sub-terete. Seeds angular in, and of the shape of, the notches in the thick septum, over 1″ with the wings.

Fls. *Apr.—June.* Fr. *Oct.—Feb.* Deciduous at the time of flowering.

Not uncommon in the valleys; Bhandara; Khairagarh; Balaghat; Nagpur Pench and Arvi forests); N. and S. Chanda.

[NOTE.—The description of the inflorescence above is that of normal S. chelonoides, but all the inflorescences collected by me are pubescent and glandular with flowers up to 1″, calyx ·3″. These closely resemble, and may possibly be the panicles of S. suaveolens, but I am inclined to think that the small tree put down when in leaf as S. chelonoides in the C. P. is often a third species, the inflorescence of which whenever collected, is put down as that of a small-flowered D. suaveolens. The point requires looking into. In any case the following var occurs.]

Var. angustifolium.

Lflts. 2—7·5″ narrowly elliptic to late-oblong, acute or acuminate, and somewhat pubescent beneath, sec. n. 6—10 prs.

Nagpur and Balaghat.

Not much used.

877. Stereospermum suaveolens, *DC.* Padar, *H.;* Parad, Paral, *Mar.;* Pandri, *Gondi;* Pedda Kalaguri, Pedda Kalagodu, *Tel.*

A middle-sized or large tree with the young parts tomentose, large odd-pinnate pubescent leaves 12—18′ long with 5—11 lflts. which are broadly elliptic or oblong, usually shortly suddenly acuminate 3—7′ long by 2—5 3 ; sec. n. 5—8 prs. Petiolule ·05—25″. Fls. fragrant in pyramidal viscidly hairy panicles with 2—3-chotomous branches. Calyx ·3—·5′ hairy. Corolla 1·2—1·5″ dull purple, yellow within. Filaments with a tuft of hair at the base. Pod 18″ by 7′, often spiral. Seeds much as in the last.

Fls. *Mar.—May.* Fr. *Sep.—Apr.*

Deciduous at the time of flowering or flowers with young leaves Ripe seed was found together with fls. at the top of the Lodu Burra (Bal.) in *Apr.*

In all divisions in the valleys, plains and plateaux, but not very common.

The wood is not much sought after, though Gamble says that it is durable, easy to work and good for building, but the amount of heartwood is small. It had the reputation in Bengal of being the most difficult wood to split. A good fire-resister. The leaves of the seedlings are simple, harsh and serrate.

(The petiolule is said usually not to attain ·1″, but this is an

378. Stereospermum xylocarpum, *Wight.* Katori, *Gondi;* Katora, *Bhumia;* Son padri, *Baiga;* Gohadan, *Mar.;* Wahawaria, *Maria;* Warawaili, *Tel.*

A large tree attaining 8 ft. girth with thick light grey bark rather smooth and flaky, moderately thick light brown blaze darkening on exposure. L. very large 2—3 ft. long, 2—3-pinnate, with rather pale or silvery appearance beneath. Lflts. elliptic to ovate, shortly acuminate, with a usually rounded base, 2—6″ long entire or coarsely-serrate. Fls. sweet-scented, large white or pinkish 1·5—2·5′ in stout panicles with the pedicels sub-capitately corymbose, upper parts of the panicles and bracts are tomentose. Corolla lobes sub-equal quadrate with crisped sub-lobed margins. Pod up to 3 ft. long, woody, tubercled, central septum ·5″ broad. Seeds 1·2″ long with the wings.

Fls. *Apr.—May* Fr. up to the following *Apr.*

Not very common. *Mixed forest of Sal in the Lormi forests* and valleys of Pantora, frequent (Bil); ghats of Balaghat, common *in the valleys; Umarjhari (Bh.);* South Chanda, frequent, chiefly among the hills.

The wood is "good and handsome" (Gamble), but it does not appear to be sold in the Southern Circle.

LII.—ACANTHACEÆ.

A. Petals twisted in bud. Anthers with 2 parallel cells, rarely one a little above the other.

I —Ovules 2 in each cell Corolla not distinctly lipped.

Corolla tube long slender. St. 2.

Anths. muticous ... ... Dædalacanthus, p. 173

Corolla tubular-ventricose. St. 4.
Anths muticous .. ... Strobilanthes, p. 174.
St. 4 Anths spurred Fls, large white ... ... Petalidium, p. 173.
St. 4 Anths. spurred. Fls. ·75′ bluish ... ... Dischoriste, p. 178.
II.—Ovules 3–12 in each cell.
(*a*) Corolla not distinctly lipped.
Fls with large leafy bracteoles.
Bract O .. ... Ruellia, p. 178.
Fls with large bract. Bracteoles O .. ... Hemigraphis, p. 178.
(*b*) Corolla distinctly 2-lipped.
Spinous herb ... ... Asteracantha, p. 172.

B. Petals imbricate in bud. Anths. with 1 or 2 cells, if 2 cells, then one placed at a higher level than the other. St. 2 perfect
I.—Ovules 2 in each cell Cor. lobes sub-equal.
Sepals 4, two outer much larger Barleria, p. 174.
II.—Ovules 2 in each cell. Cor. distinctly 2-lipped.
(*a*) Corolla 1·5′ white Stout shrub .. ... Adhatoda, p. 178.
(*b*) Corolla under 1·5′.
1. Lower anther-cell spurred.
Spur minute. Fls 2—4-ranked in spikes ... Justicia, p. 177.
Spur large. Spikes unilateral ... Rungia.
2. Anther cells not spurred.
Bracts and bracteoles minute or O. Fls white ... Rhinacanthus, p. 177.
III—Ovules 3—10 in each cell Cor. 2-lipped.
Corolla small with slender tube ... Andrographis, p. 178.

879. Asteracantha longifolia, *Nees.* Syn. Hygrophila spinosa, *T. Anders.*

A conspicuous ditch or marsh herb, 3—4 ft. high, with long willow-like leaves and dense spiney whorls of handsome purple flowers, the lower lip ·5′ broad with yellow palate. Spines usually 6 in a whorl, often 1″ long.

Fls. *Nov.—Dec.* Common in all divisions.

It is only referred to here as being (*fide* Witt) a favourite food of camels and called in Berar "Unt Katara."

380. Petalidium barlerioides, *Nees.* Mormari, *Mar.*; Divari, *Gondi.*

A straggling shrub, sometimes 5 ft., with straw-coloured twigs and ovate, toothed or crenate acuminate puberulous leaves (which are very few at the time of flowering) 2—4' long or even attaining 6" by 4" with the base decurrent on the long petiole. Fls. rather large, white, in dense spikes (abbreviated lateral branches). Readily recognised by the large green veined prs. of bracteoles ·75" long, strongly ribbed lower lip of corolla, and the long fulvous hairs within it. Anthers 4 with long spurs (Cp also Dædalacanthus and Justicia betonica).

Fls. *Feb.—Apr.* Fr. *Apr.*

Frequent, Bh; N. Ch.; Bal, etc. Forms a dense undergrowth (formerly called Strobilanthes) in Allapalli (S. Ch.) and some other forests.

381. Dædalacanthus purpurascens, *T. Anders.* Karse Walam, *Gondi.*

A handsome undershrub, 2—4 ft. high, with puberulous somewhat angled branches and lar
ovate acuminate leaves 4—6' with the base d
rent on the slender petiole and with 6—
sec. n. Fls. lilac or blue-purple 1—1·5' l
·75" diam. in dense bracteate spikes,
short peduncles. Bracts imbricate pale
veins.

Fls. *Nov.—Feb.*

In the damper forests or ravines. Gitola (Bh.), Pondi and Sonakhan range (Bil.); S. Ch.; Balod range (Rai.). Also in other divisions.

882. Strobilanthes auriculatus, *Nees.* Marmari dara, *Gondi;* Mohate, *Baiga;* Lamani, *Chh.*

An undershrub, 2—6 ft., with simple oblong or ovate or lanceolate crenate leaves attaining 10″ long and 2·25″ broad, one in a pair often larger than the other. Very beautiful when in full fl. with blue fls. 1″ long in dense elongating spikes at first 1—3″ long with densely imbricate obovate obtuse glandular and pubescent bracts.

Fls. (periodically) *Nov.—Feb.* Fr. *Mar.—Apr.*

All divisions Gregarious in the damper forests, especially along rocky ravines. It is said to fl. every six years, and a general flowering took place in 1911, when some nalas, *e.g.*, Bodal-Kasa in Sonawani forests (Balaghat) were a mass of blue. A general flowering took place in Chota Nagpur in 1898.

Key to Barleria.

A. Prickly. Fls. yellow ... ... Prionitis.
B. Not prickly. Fls. not yellow.
  I.—Hoary undershrubs. Sepals spinulose-toothed. ... ... reticulata.
  II.—Not hoary.
    (*a*) Leaves adpressed hairy beneath.
      Fls. bright rose. Sepals spinulose-toothed ... ... cristata.
      Fls blue. Sepals denticulate or entire ... ... strigosa.
    (*b*) Leaves glabrous glaucous beneath.
      Fls blue.
      L. acuminate. Seeds glabrous . Gibsoni
      L. acute. Seeds hairy ... montana.

383. Barleria Prionitis, *L.* Koti, *Mar.*; Gormiri, *Tel.*

A prickly undershrub, 2—5 ft. high, with glabrous elliptic leaves 1·5—4" long, acuminate at both ends, and yellow fls. in the leaf axils and in terminal spikes with elliptic spine-tipped bracts. The sepals also are sometimes spine-tipped.

Fls. *June—Jan.* Fr. *Jan.—Mar.*

Under shade, frequent. Also in open forest.

The typical plant according to Clarke (in F. B. I.) has the "bracteoles very small, reduced to bristles or O, sepals broadly lanceolate acuminate, leaves glabrous or sometimes tawny sericeous beneath." The following therefore appears to be a variety:—

Var.

Leaves oblanceolate densely sub-strigosely hairy beneath. Bracts oblanceolate ·5". Bracteoles ·4" subulate, the midrib produced into a long spine.

On quartzite rocks, Warora range, N. Ch.

384. Barleria reticulata, *Haines* (near longiflora, *L. f.*).

A much branched hoary shrub, 2—3 ft. high, somewhat resembling a Sage bush, with glandular hirsute branches and white tomentose ell. or ovate leaves ·75—1" long with obtuse or acute base. Petiole ·25—·5". Fls. in numerous short terminal spikes with two spreading linear-oblanceolate bracteoles ·3—·4" long and two large obovate scarious veined spinulose-toothed sepals ·5—·7" long. Corolla not seen but, from the remains of the style, the tube is over 2·25" long and (from a dried up flower bud) somewhat pubescent without, lobes acute. Capsule brown ·5′ with shaggy seed.

Fls. probably *Oct.—Nov.* Fr. *Jan.—Feb.*

Quartzite rocks, N. Ch.

(In default of fully developed leaves and flowers, I have not yet given the Latin description of this species The sepals in texture and toothing resembling those of pilosa.)

385. Barleria montana, *Nees.*

An undershrub, 3—4 ft high, with long branches from the root, ovate-lanceolate or lanceolate sub-acuminate leaves 5—6″ long below, smaller upwards, pale glaucous beneath, glabrous, lower very shortly petioled. Fls. handsome axillary and in dense spikes 3—8′ long, with foliaceous bracts and linear bracteoles. Corolla nearly 2″ by 1·5″ rose-coloured.

Fls. *Oct.—Nov.* Fr. *Jan.*

Moister forests, along valleys and shady sides of hills. Pench and Arvi (on laterite), N. W.; S. Ch.

386. Barleria Gibsoni, *Dalz.*

Closely resembles B. montana, but said to differ in the leaves being acute instead of acuminate, the corolla larger and in the *seeds* being *glabrous* instead of densely hairy. I doubt their specific distinctness.

Chanda.

387. Barleria cristata, *L.*

An erect or diffuse undershrub, 1—3 ft. high, with lanceolate oblong-lanceolate or elliptic leaves 2—5·5″ acute or acuminate, pale beneath and axillary and terminal clusters of light rose-coloured fls. 1·5—1·75″ long, with a pair of large more or less spinulosely-toothed sepals. Branches and leaves always more or less strigosely hairy.

Fls. *Sep.—Nov.* Fr. *Oct.—Jan.*

Common in the forests in all divisions It is often covered with fls in sunny positions, and is then very handsome. Frequently introduced into gardens.

388. Barleria strigosa, *Willd.*

An undershrub, 2—4 ft. high with large ovate acuminate leaves 4—8″ by 2—5″, decurrent on the petiole and large handsome azure-blue flowers 2″ long and 1·25′ wide, in dense bracteolate one-sided spikes. Easily recognised by the two larger sepals being imbricate in a row on the upper surface and the bracteoles in rows on the sides of the spikes.

Fls. *Oct.—Nov.* Fr. *Dec.*

In shady damp valleys, common.

389. Justicia Betonica, *L.*

Undershrub, 2—4 ft. high, with ovate-lanceolate leaves acuminate at both ends and small white rose-spotted fls. in axillary and terminal 1—3-nate spikes conspicuous from the closely-seriate white green-veined ovate mucronate bracts.

Fls., fr. *Nov.—Jan.*

Rocky ravines, in most divisions.

390. Rhinacanthus communis, *Nees.*

A slender divaricately branched undershrub 3—4 ft. with large elliptic, obovate or ovate-oblong acuminate leaves, attaining 9·5 by 3·25″, narrowed into a petiole 1·5—2″ long, gradually smaller upwards, and large spreading nearly naked 3-chotomous panicles of pure white-lipped fls. Corolla-tube narrowed ·8″ long, lower lip ·6 by ·5″, 3-lobed.

Fls. *Jan.—Apr.*

Rocky ground under shade, Sironcha forests.

NOTE.—C.B. Clarke throws doubt on this plant being wild. It is, however, quite wild both here and in Bengal.

391. Adhatoda Vasica, *Nees.* Adorsa, *Mar.*, is a large shrub frequently cultivated, wild in the United Provinces. It has large ell. leaves with fœtid smell and dense spikes of large white-lipped fls.

It is a good insecticide.

Numerous herbs and small undershrubs of this family occur in the forests. Among these may be mentioned :—

392. Andrographis paniculata *Nees.* Called Chireta or Chirainta. An erect herb, 1—3 ft. with lanceolate glabrous leaves, about 2·5″ and small-lipped fls., ·5″, vertical on spreading panicled racemes. It is widely used in fever (not to be confounded with the true 'Chiretta' = Swertia sp.). Also numerous species of Justicia and Lepidagathis.

393. Hemigraphis latebrosa.

With pretty little blue fls. and soft leaves; Ruellia suffruticosa, R. Beddomei, and R. prostrata with purple fls. and Dischoriste vagans with blue fls.

Various species of climbing Thumbergia, and numerous shrubs are also in cultivation for the beauty of their fls., while Thumbergia fragrans occurs wild.

LIII.—VERBENACEÆ.

A. Inflorescence capitate.
  Fls. in capitate spikes. Drupels succulent ... ... Lantana, p 179.
  Fls. in involucrate 3—9-fld. capitate cymes ... ... Symphorema, p. 188.
B. Inflorescence of corymbose or panicled cymes.
  I.—Leaves simple
    (*a*) Fls. regular. St. 4—5 exserted spreading.
      Cymes axillary, corymbose ... Callicarpa, p. 180.
      Panicles very large and terminal Tectona, p. 180.
    (*b*) Fls. irregular. St. 4 didynamous.
      1. Fls. very small white, corymbose ... . Premna, p. 180.
      2. Fls over 1″ yellow ... Gmelina, p. 183.
      3. Fls white or blue in elongate panicled cymes.
        Fls. with long slender corolla tube ... ... Clerodendron, p. 186.
        Fls. with short corolla tube ... Caryopteris, p. 188.
  II.—Leaves digitate ... ... Vitex, p. 185.

394. Lantana Camara, *L.* (Syn. · L. aculeata, *L.*)

A straggling or scandent shrub, with small recurved prickles on the brown branches. L. cordate serrate rugose pubescent 2—3″. Fls. crimson, red or yellowish in axillary stalked heads. Fr. of small black drupes.

Fls. and *fr.* principally in the rains.

A very common introduced shrub, but showing little tendency to run wild in the Southern Circle. It is a useful hedge plant if cut back.

395. Callicarpa arborea, *Roxb.*

A small or m.-s. tree with pale sand-coloured bark, soft whitish blaze with yellow streaks, 4-angular tomentose branchlets, large ovate to ovate-lanceolate or ovate-oblong acute or sub-acuminate entire leaves 5·5—12″ long, tomentose beneath with a rounded base and 8—12 prs of sec. n. and strong cross tertiaries. Petiole ·75—1·5″. Fls. small, lilac-purple in dense 2-chotomous corymbose cymes 3—5″ across. Drupe purple ·1—·12″.

Fls. *May—June.* Fr. *Aug.—Nov.* Evergreen.

Very rare. *On the ghats in Dhuri-Mangli forest* (Bal.).

396. Tectona grandis, *L. f.* Sagwan, *Mar.*; Teka, *Gondi*; Teku, *Tel.* The Teak tree

A small or large tree with light-coloured bark peeling off in thin narrow longitudinal strips.

Fls. *July—Aug.* **Fr.** *Nov.—Jan.*

It will probably reach 6 ft. girth while sound in many of the South Chanda forests and in a few valleys, with good drainage and soil derived from metamorphic rocks, in other divisions. *On trap it is a small tree.* Usually absent from quartzite plateaux and from the Sal areas, though occasionally found mixed with Sal.

Key to Premna.

A. Trees or large shrubs.	
L. 2—4″ entire	... latifolia.
L. 3·5—6″ serrate, nearly glabrous	... barbata
L. 5·5—10″ entire or dentate, somewhat pubescent	... gmelinoides.
L. 5—8″ yellow tomentose ...	... tomentosa.
B. Herb with woody root-stock...	... herbacea.

397. Premna latifolia, *Roxb.* Var. viburnoides. Dakar, *Mar.*

A small tree with light-grey thin bark and white blaze. Leaves thin, usually broadly ovate, obtuse with obtuse base, suddenly shortly cuneately decurrent on the petiole, 2—4″, drying blue-green, minutely puberulous above and pubescent on nerves beneath, sec. n. 4—7 each side. Fls. small, white, in terminal corymbose compound sub-sessile cymes 1—5″ broad. Calyx with 5 small sub-equal teeth. Corolla white, tubular 2-lipped ·2″ long, upper lip notched, lower longer with 3 large lobes. Drupe ·25″ diam., black.

Fls. *June—July.* Elsewhere *Apr.—May.*

Rare. Dhaba forests (S. Ch.).

The typical plant has tapering leaves and petioles only ·25—·75″ long, and dries nearly black, the Chanda plant has petioles up to 1·6″. The smell is characteristic, somewhat fœtidly-aromatic.

398. Premna barbata, *Wall.* Sendri, Sendu, *Gondi.*

A small tree with yellow-brown twigs. L. ovate-lanceolate, more rarely ovate-oblong or ovate, sub-acuminate to long-acuminate with rounded or broadly cuneate base, 3·5—6″, drying green, usually some at least on the tree more or less serrate, nerves usually puberulous (the new shoots are hairy) petiole ·75—2·5″. Fls. small, white, in terminal corymbose peduncled cymes 1—2·5″ broad. Calyx 4-lobed or one lobe again lobed. Corolla under 2′ long. Drupe globose or pyriform 2·2′ diam

Fls. *Apr.—May.* Fr. *May—June.*

Occasional in valleys. Sonawani forests and Dhiri-Mangli forests (Bal.); Pantora range (Bil.) under the hills.

399. Premna gmelinoides, *Haines* (near flavescens, *Ham.*). Kamar, *H.*

A tree somewhat resembling (when growing) *Gmelina arborea* attaining 4 ft. girth with light-brown bark and light-coloured blaze with brown spots and streaks. Innovations tomentose Twigs light-brown, somewhat striate and puberulous, with large broadly elliptic, ovate and ovate-cordate leaves 5·5—10″ by 3—7″, acute or shortly acuminate, entire or coarsely dentate, with sweet aromatic odour, dotted with minute yellow glands both sides mature thinly pubescent beneath and on the nerves above with simple or forked hairs; base rounded, oblique or cordate; sec. n. 6—7 each side strong and tertiaries raised, more or less scalariform. Petioles 2—5″ joined by a villous and glandular line. Fls. in broad cymose panicles with linear-filiform bracts ·25—·7″ long. Peduncles short. Calyx gland-dotted, more or less 2-lipped (in fruit) with the lips shallowly lobed or entire. Fr. ·12″ diam.

Fls. *July—Aug.* (?). Fr. *Aug.—Sep.*

In the hills of Bhandara, Balaghat, Khairagarh frequent, on schist and quartzite rocks; elev. 1,800 ft.

NOTE.—I have not seen the tree in flower and the remains of the single inflorescence was badly decayed, but it seems advisable to give the tree a nom-de-plume. It is the same tree as Premna No. 3, described on p. 482 of "Forest Flora of Chota Nagpur."

400. Premna tomentosa, *Wall.*

A m.-s. tree with light-brown bark and densely yellow woolly tomentose twigs and innovations. L. 5—8″ (up to 10 by 6·5″ on large coppice shoots) ovate acuminate with cordate base, mature very stellately tomentose beneath and covered with minute glandular scales between the hairs with the characteristic smell of Premna slightly rough above after the fall of the hairs. Petiole 1—2′. Panicles compact 2—4″ diam. with small greenish-yellow fls. Calyx more or less 5-lobed. Drupe ovoid.

Fls. *Mar.—Apr.* with the new leaves. Fr. *May.*

(Times of flowering and fruiting and description of fls. and fr. from South India specimens.)
Valley near Wamanpalli, S. Ch.

401. Premna herbacea, *Roxb.*

An interesting little plant, with a stout woody root-stock and herbaceous shoots 1—4″ high, with sessile obovate coarsely serrate leaves 2—4″, usually appressed to the ground. Fls. very small in white corymbs 1·5″ diam.

Fls *Apr.—June.* Fr. *May—July.*

On open ground annually burnt, frequent. The plant is said to be used medicinally.

402. Gmelina arborea, *L.* Gambhar, Kamar, *H.;* Shewan, Siwan, *Mar.;* Kursi, *Gond.;* Kasamar, *Kol.;* Gumar Teku, *Tel.*

A m.-s tree (rarely large in the C. P.) with light-grey bark exfoliating in paler-coloured patches when old, and thick pale yellow blaze with thin chlorophyll layer outside and white inside.

L. broadly ovate or cordate 4—9" by 2·5—8", base 3—5-nerved and usually cuneate on the 2—6" long petiole. Fls. irregular 1—1·5" long, reddish or brown and yellow in lateral and terminal panicles. Fr. a succulent drupe, 1" diam.

Fls. *Feb.—Apr.* when more or less leafless. Fr. *May—June.*

In all divisions, especially on the cool sides of the hills. The wood is largely used for making drums. It is good for planking and does not warp or shrink, and is worthy of more attention in sylvicultural operations. Cattle and deer are very fond of the fruit.

Var. *α* **typica.** Leaves densely stellately hairy or tomentose beneath. S. Ch.

Var. *β* **glaucescens,** *Clarke.* L. glabrous and glaucous beneath, covered with microscopic glands. In all divisions.

The embyro, on germination, breaks off a cap from each fertile loculus of the stone (as in Teak). The seedlings have strongly toothed leaves, and such toothed leaves are sometimes found on mature plants.

403. Gmelina asiatica, *L.* Chinta ganer, Chetu, *Tel.;* Nag phul, *H.*

A large shrub, with yellow, often spinescent branchlets, small ovate or obovate entire or lobed obtuse leaves narrowed into a short slender petiole and yellow fls. 1·5" long in short tomentose racemes.

Fls. *Apr.—June.*

Dhaba forest, S. Ch. The specimen was said to have been collected by a native collector in above locality. It is, however, often grown in gardens.

Key to Vitex.

L. 3—5-foliolate finely tomentose. Panicles narrow oblong	Negundo.
L. 3—5-foliolate. Fls. in divaricate axillary cymes	leucoxylon.
L 3-foliolate, glabrous. Panicles narrow oblong	peduncularis.
As in *peduncularis* but leaflets pubescent beneath	altissima.

404. Vitex Negundo, *L.*

A large strongly-scented shrub, 5—12 ft. covered with a fine hoary tomentum, with digitately 3—5-foliolate leaves, acuminate leaflets and small white or lavender-coloured fls. on the short cymose branches of oblong panicles 2—8″ long.

Fls. and fr. *May—Aug.* and at other times. Evergreen.

Frequent in waste ground, near river banks, etc. Used as a stomachic.

Var. incisa, with the leaflets cuneate serrate or sub-pinnatifid is scarcely worthy of even varietal rank. It occurs near Balaghat with the normal form.

405. Vitex leucoxylon, *L.f.* Narda, *Mar.*

A large shrub or a m.-s. tree, with dark bark, pubescent or silky shoots, 3—5-foliolate nearly glabrous leaves. Lflts. lanceolate 1—4·5″ by ·3—1·5″ acute or acuminate entire or (in very young plants) serrate, dark, shining above, paler beneath, often hairy on each side of the midrib. Petiole 1—3″. Petiolules ·5—1″. Fls. white, lipped, ·5″ across in divaricate dichasial axillary long peduncled cymes. Drupe ·5—·7″.

Fls. *Mar.—June* and *Oct.* (perhaps all the year round). Evergreen. (?)

Along rocky river banks, N. and S. Ch.; Laon range and S. Sihawa (Rai.); Bori (N. W.); Baghnadi (the boundary of Bhandara and Khairagarh).

(Witt says in his Behar list "a large deciduous tree with white bark and wholly glabrous leaves." I think that this must be another species.)

406. Vitex peduncularis, *Wall.* Morphai, *Tel.*

A tree (of small size in the C. P.) with a light yellow blaze turning darker on exposure and light-brown in centre. Shoots pubescent with constantly 3-foliolate leaves well distinguished when young by the winged petiole. Leaflets narrowly elliptic or lanceolate 3—7″ acuminate glabrous concolorous. Petiole 1·5—3″, petiolules ·25″. Panicles narrow oblong 6—11″ long, cymose lateral branches 1″ or less.

Fls. *May—June.* Fr. *Aug.—Sep.* Evergreen.

Valleys and shady sides of hills, rare. Salebhat nala, Sihoa (Rai.); Mater Tugu nala, Sironcha (S. Ch.).

The wood is used for yokes in Chota Nagpur.

407. Vitex altissima, *L. f.*, with the same vernacular name, and the leaves pubescent beneath occurs (*f.* Donald) in Cherla.

As no specimen of the Sironcha 'Morphai' was collected, it may have been this

408. Clerodendron Phlomidis, *L. f.* Safed tekar, *Mar.*

A large shrub with somewhat hoary pubescent, usually drooping shoots, puberulous ovate or sub-rhomboid crenate-serrate, dentate, or sub-entire leaves usually about 2″ by 1·5″ (but very small ones occur near the panicle, and the large ones attain 3·5″ by 3·5″) and axillary and terminal cymose panicles of white fls. ·75″ diam. with the tube ·75—1″ long.

Fls. *Sep.—Jan.* Also *Apr.* (perhaps all the year).

Common in the village hedges.

Var. **Donaldi**, Kala tekar, *Mar.*

"A semi-scandent shrub or small tree, found in moist localities in the forests."—*Donald* (in Working Plan List).

Mr. Donald distinguished this variety by the leaves attaining 3·25″ (while those of 'Safed tekar' only reach 1·75″), glabrous membranous, with a cuneate base (type pubescent on both sides). Calyx ·25″ in flower and enlarged calyx as long as lobes of fruit only, which is ·3″ long (in 'Safed tekar,' the sepals are acuminate and are at least ·12″ longer than the fruit) glabrous, deltoid apiculate. Corolla ·75″ long.

The plant would thus appear very distinct. The 'Safed tekar' is used in native medicine but not the 'Kala tekar.' S. Ch.

409. Clerodendron serratum, *Spreng.* Barangi, *H.*; Duma, *Chh.*

An irregularly branched perennial shrub or, after being burnt, with tall, straight sub-herbaceous stems 3—6 ft. high from the root-stock, with opp. or 3-nate sub-sessile coarsely serrate leaves 3—6″ long and large pubescent panicles of blue (sometimes white) fls. 1″ or more across with the tube ·3—·5″.

Fls. *Apr.—Nov.* Fr. *May—Dec.*

Common in valleys in all divisions.

410. Clerodendron infortunatum, *Gaertn.*

A robust shrub or undershrub, 4—6 ft., with densely fulvous-hairy branches, large ovate, usually cordate leaves 4—8″ long and broad, and large terminal 3-chotomous corymbose panicles of white and pink fls. 1″ diam. Conspicuous in fruit from the large red calyces.

Fls. *Feb.—May.* Fr. *May—July.*

In shady forests. Lormi and Pantora ranges (Bil.).

411. Caryopteris Wallichiana, *Schauer.*

A laxly-branched tall shrub, 6—15 ft., with grey bark peeling off in thin longitudinal strips. Blaze pink. Branches 4-angled sub-tomentose. Leaves lanceolate 2—4″ long. Easily recognised by the numerous yellow glands and the spreading blue and white, or lilac fls. in small cymes which are arranged in narrow axillary and terminal thyrses (somewhat as in Clerodendron serratum).

Fls. *Dec.—Mar.*

Near rivers, Laughar (Bal.).

412. Symphorema polyandrum, *Wight.* Chitki, *Mar.;* Tapa Thonda, *Gondi.*

A large scandent or scrambling shrub with ovate villous coarsely toothed leaves 4—5″ long (reaching 8—9″). Easily recognised in flower by the clusters of grey-tomentose involucral leaves surrounding a (usually) 7-fld. head of white fls. with a 10—16″ partite corolla and exserted stamens. Calyx ·25—·3″ long, corolla tube and petals each ·25—·3″ long.

Fls. *Mar.—Apr.* Deciduous at the same time.

Not uncommon. Laon range (Rai.); Dhaba range (S. Ch.), etc.

LIV.—LABIATÆ.

A. Shrubs or undershrubs. Corolla lobes flat. St 4, anthers 1-celled
  St. declinate, with jointed hairs. Calyx toothed ... ... Pogostemon.
  St. short, not hairy. Sepals elongate and hairy ... ... Colebrookia.

B. Herbs or very small undershrubs. Corolla 2-lipped.
  I.—St declinate.
    (*a*) Leaves simple. St. exserted.
      Whorls 6—8-fld. panicled. Lower corolla lip boat-shaped ... Plectranthus.
      Fls in dense oblong spikes. Lower cor. lip concave ... ... Anisochilus.
      Cymes axillary and panicled. Lower cor. lip 3-lobed with mid-lobe saccate ... ... Hyptis.
    (*b*) L pinnatifid. St. included ... Lavandula.
  II.—St. ascending, upper corolla lobe flat notched, not hooded
      A small undershrub resembling Thyme ... ... Micromeria.
  III.—St. didynamous, ascending under the erect, often hooded, entire upper lobe of the corolla.
    (*a*) Upper cor. lip nearly flat. Coarse herb . ... Anisomeles.
    (*b*) Upper cor. lip hooded villous.
      Fls. white. Bracts not spinescent Leucas
      Fls. scarlet. Bracts spinescent ... Leonotis.

418. Pogostemon plectranthoides, *Desf.*

An aromatic undershrub, sometimes attaining 6 ft. high with 4-sided branches, large ovate, coarsely crenate leaves about 4·5″ by 3·5″ and small white fls. conspicuous from the light purple stamens. Fls. in dense sub-capitate 1-sided bracteate cymes which are secund on the branches of a large panicle.

Fls. *Jan.—Mar.*

In damp localities, frequently gregarious. Very abundant in parts of Pandiahtolah forest (Bal); Bh.; S. Ch.; Bil.; Sihoa forests (Rai.).

414. Colebrookia oppositifolia, *Sm.*

A large spreading soft shrub 5—10 ft. with stout whitish branchlets, large white-tomentose crenate, sometimes ternate, leaves 4—8″ and very small white fls. densely whorled in panicled spikes. The calyx teeth elongate and become plumose in fruit.

Fls. *Dec.—Feb.* Fr. *Feb—Mar.*

Valleys and shady hillsides. Sonawani range, Dhansua range, and ascending to the top of the 'dadars' on the Baihar and Raigarh plateaux (Bal.); Bil, frequent.

Numerous other plants belonging to this family are found in the forests and especially plateaux. They are mostly sweetly aromatic. Among them may be mentioned :—

415. Lavandula Burmanni, *Benth.* Wild lavender, with pinnatisect leaves. 416. Anisochilus carnosus, *Wall.*, chiefly on rocks. 417. Nepeta ruderalis, *Ham.* 418. Micromeria capitellata, *Benth.*, beautifully scented 419. Anisomeles ovata, *Br.*, a coarse annual up to 4 ft. high. 420. Leonotis nepetæfolia, *Br.*, a coarse annual up to 6 ft. high, with scarlet fls. in prickly heads.

Several small weeds belonging to the family of **Amarantaceæ** (Amarantus spinosus, etc., Digera arvensis, Achyranthes aspera), **Portulaceæ** (Portulaca oleracea and quadrifida), **Chenopodiaceæ** (Basella rubra, a cultivated succulent twiner), **Polygonaceæ** (Polygonum spp) and **Nyctaginaceæ** (Boerhaavia repens) are common and used as pot-herbs. They occur chiefly outside the forests.

LV—PIPERACEÆ.

421. Piper longum, *L.* Ralli, *Bhumia.*

The *long-pepper*, is found in the cool ravines of the Lormi mountains. It is a creeping and rambling herb with distinct alt. cordate shining 7-nerved leaves and spikes of very minute sessile fls.

Fls. *Aug.—Dec.*

LVI.—LAURACEÆ.

Trees	Litsæa.
Filiform parasite	Cassytha.

Key to Litsæa.

Perianth rudimentary. L. without strong tertiary nerves	sebifera.
Perianthsegments 6. L. with strong tertiary nerves...	polyantha.

422. Litsæa sebifera, *Pers.* Lenjo, *Gondi;* Ranamba, *Mar.;* Nara Mamri, *Tel.*

A small tree with light grey bark, blaze streaked grey and white, tomentose shoots, narrowly to broadly elliptic leaves, acute or obtuse at both ends, glabrescent except sometimes on the nerves 3—9·5" long, and slightly aromatic. Petiole slender. Fls. greenish, small, in small corymbose umbels. Fr. black shining globose ·3' diam. on the slightly enlarged perianth tube

Fls. *June—July.* Fr. *Oct.—Nov.* Evergreen. New shoots in *May.*

Widely spread but not common. In valleys Rai.; Bal; S. Ch.; Bil; Nishani hill forest (Bh).

423: Litsæa polyantha, *Juss*

A small tree with smooth bark and blaze a mixture of brown and white, brown-pubescent branchlets, strongly nerved ell. or oblanceolate-oblong obtuse or sub-acute leaves 4·5—9" long, pubescent and glaucous beneath with 7—12 prs. strong sec. n. and raised parallel cross nervules. Fls small greenish, with usually 5 linear sepals, in stout peduncled umbels which are axillary and clustered along the branchlets. Fr. ·25—·5' long, seated on the shallow saucer-shaped perianth base.

Fls. *Mar.—May.* Fr. *July—Aug.* Evergreen. Leaves renewed in *May.*

In valleys, especially near flowing streams, rare. Silhoa forests Rai.; Lormi forests (Bil.); Katonda (N. Ch.)

424. Cassytha filiformis, *L.* Amarbel, Adharbel, *H.*

A filiform leafless glabrous or pubescent parasite attaching itself by means of haustoria to Sal, Carissa and other bushes, resembling Cuscuta (q. v.) but dark green in appearance. Fls. green or white (when fully out), under ·1″, sessile, in spikes ·5—1·5′ long with 3 broad ovate imbricating bracts at the base. Fr. small globose crowned by the perianth lobes

Fls., fr. esp. *Sep.—Dec.*

Very common in S Ch ; N Ch. ; less common in other districts. It is noteworthy that the Cassytha and Cuscuta are seldom found in the same localities.

LVII.-- LORANTHACEÆ.

Fls. 2-sexual. Corolla tubular ... Loranthus.
Fls. 1-sexual Perianth very small with
3—4 deciduous lobes ... ... Viscum.

425. Loranthus longiflorus, *Desrouss.* Moheka bandha, *H.*; Tunki bajania, Wajinika, *Tel.*; Hitili, *Gondi.*

A large parasitic shrub with very variable coriaceous usually sessile glabrous leaves 3—6′ long or more and pink or scarlet fls. over 1″ long in axillary and terminal racemes.

Fls. *Feb.—Apr.*

Common in all divisions on Mohwa, Boswellia, etc. [The pink fld. is very common in Raipur Were it not for the innumerable varieties of this plant, it could be ranked as a distinct species. The young leaves are green not red, sessile and amplexicaul, ovate or oblong-ovate Racemes hoary. Anthers shorter than the filaments. Cor. puberulous. It fls. after the red one is in fruit.]

426. Loranthus Scurrula, *L.*

A tufted parasitic shrub, young parts with a brown or white furfuraceous tomentum. Leaves ovate-oblong or elliptic 2—4″, mature sometimes glabrous. Fls. in contracted racemes, green, under ·5″ long with bright red filaments. Fr. clavate.

Fls. *Nov.—Jan.* Fr. *Dec.—Mar.*

On Woodfordia, Combretum, Wendlandia and other trees. Rai.; Bil.

427. Viscum orientale, *Willd.* Bandha, *H.;* Gurbel, *Gondi.*

A parasitic shrub with terete 2—3-chotomous or sub-verticellate branches, obovate or ell.-oblong sub-sessile 3-nerved leaves about 1·5 by ·6″ or less with a mat surface and small yellowish fls. under ·1″ long sessile in axillary and terminal fascicles. Fr. ·25″ diam.

Fls. *Feb.—June.* Fr. *Nov.* (and other times).

Raipur; Chanda. On Zizyphus, etc.

428. Viscum articulatum, *Burm.*

A leafless parasitic shrub with sap-green striate often sub-verticellate flattened branches contracted at the nodes.

Fls. *Dec.—Jan.*

All divisions chiefly on Diospyros.

LVIII.—SANTALACEÆ.

429. Santalum album, *L.* Chandan, *H.*

A small glabrous evergreen tree, a hemi-parasite on roots. L. opp. 1—2 2″ long ell. or ovate-lanceolate. Fls. small purple in terminal 3-chotomous panicles, ·17″ diam. Fr. globose shining black.

Fls. *Mar.* Fr. *Nov.*

Introduced into N. Chanda and S. Chanda forests where it is growing fairly well, and reproducing itself in N. Chanda.

LIX.—EUPHORBIACEÆ.

A. M. fls reduced to single pedicelled stamens, surrounded by a calyx-like involucre which sometimes includes also a single pedicelled ovary.

Trees or shrubs with green fleshy branches and milky juice ... ... Euphorbia, p. 197.

B. Fls. not reduced to single stamens and pistils.

I.—Cells of ovary 2-ovuled.

(*a*) St 3—6 free or connate. Ovary 2-many-celled. Stigmas not dilated Fls. fascicled, axillary.

1. Petals present (very small). St. united below. Sepals valvate.

Ovary 2-celled. Fr. drupaceous... Bridelia, p. 199.
Ovary 3-celled. Fr. dry ... Cleistanthus, p 200.

2. Petals O. Sepals imbricate.

Disc O. Styles united in a column round a depressed centre. Fr. multilocular, capsular ... Glochidion, p 202.

Disc of small glands. Stigmas sessile. Fr. baccate ... ... Kirganella, p. 201.

Disc of distinct scales (exc. P. Emblica). Styles slender Pistillode O Phyllanthus, p. 200.
Disc of glands Styles slender recurved. Pistillode large ... Flueggia, p. 203.

(*b*) St. 2—3. Ovary 2—3-celled. Stigmas dilated.

M fls in minute capitate axillary racemes. F fl. 1—2 axillary ... Putranjiva, p. 204.

(*c*) St. 2—7. Fls. in slender spikes or racemes ... ... Antidesma, p. 204

59. EUPHORBIACEÆ.

II.—Cells of ovary 1-ovuled.

(*a*) Sepals imbricate. Pet. present in male or both sexes.

1. Fls. in spikes or racemes. St. ∝.
   - Racemes axillary and terminal. Petals villous ... ... Croton.
   - Racemes axillary. Garden shrubs with ornamental leaves (Crotons) Codiæum, p. 206.
2. Fls. in axillary and sub-terminal panicles.
   - Stellately tomentose tree ... Givotia, p. 206.
3. Fls. in terminal 2—3-chotomous cymes. Shrubs ... ... Jatropha, p. 205.

(*b*) Sepals valvate. Petals O. Styles long.

1. L. opposite. M. fl. racemose. F. few ... ... Trewia.
2. L. alt. Fls. spiked, racemed or panicled.
   - i. Filaments not connate in bundles. L. palmi-nerved.
     - Anther-cells 2-globose. Trees ... Mallotus, p. 207.
     - Anther-cells 2, erect slender. F. fls. with large bracts. Shrubs or herbs ... ... Acalypha, p. 206
     - Anther-cells 2 adnate on the sub-reniform anths. Undershrub ... Baliospermum, p. 208.
   - ii. Filaments not connate in bundles. *L. penni-nerved.
     - Tree. Anther-cells oblong, dorsifixed ... ... Gelonium, p. 208.
   - iii. Filaments connate in bundles.
     - Fls. in short or long axillary spikes Homonoia, p. 207.
     - Fls. in terminal panicles ... Ricinus, p. 208.

(*c*) Male sepals valvate, fem. imbricate. Styles united.

A climber with hispid stinging hairs Tragia, p. 209.

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* **Not recorded but probably occurs.**

Key to Euphorbia.

A. Branches unarmed ... ... Tirucalli.

B. Branches with stipular prickles.

I.—Main stems 1 or few with numerous branches.

Branches terete, tubercles not raised ... Nivulia.

Branches with 5 raised tubercular lines ... nereifolia.

II.—Branches many from the root, not again branched ... ... caducifolia.

430. Euphorbia Tirucalli, *L.* Newaranga, *Mar.*

A large shrub or small tree up to 25 ft. high with milky juice and erect green quill-like leafless branches, or leaves very small and caducous.

An introduced plant, common in village hedges, especially (*e.g.*, about Chorkamara) in Bhandara.

431. Euphorbia nivulia, *Ham.* Kothuthuwa, *Mar.;* Jepada, *Tel* (Syn. E. nereifolia, *Roxb.* and *Cooke.*)

A tree 15—30 ft. high with thick rugose corky bark below (when old), and spreading often whorled fleshy branches. Branches thick terete with flat brown or black corky areas bearing 2 stipular thorns 25—·3″ long. Rarely on depressed tubercles. L. obovate or oblanceolate to spathulate-obovate, 4 to 9″, with rounded or slightly retuse tip. Fls. in fleshy involucres usually 3-nate in peduncled cymes from the leaf scars and near the ends of the branches Anthers purple or red didymous retuse, not at all apiculate, dehiscence oblique.

Fls. *Feb.—Apr.* Fr. *Apr.* Leafless *Feb.—June.*

Usually in rocky places. Sometimes under cover where the rocks are near the surface. In all divisions.

432. Euphorbia nereifolia, *L.* (not of Roxb.). Syn. E. ligularia. *Roxb.*

A large branched shrub or small tree 6—15 ft. high with milky juice and sharp stipular thorns on sub-confluent tubercles arranged in 5 vertical or spiral lines. Leaves narrowly obovate or obovate-oblong. Involucres or receptacles much as in the last (the first are male and bear two ovate-lanceolate bracts at the base of the short pedicel. In the axils of these arise two turbinate receptacles bearing female fls. and again subtended by a pr. of bracts, the ultimate cymes are 3-chotomous) Anthers apiculate, dehiscence longitudinal.

Fls. *Feb.—Mar.* Deciduous *Mar.—June.*

Common in village hedges, etc., but not seen wild. This is also the case in Bengal.

[NOTE.—Cooke follows Roxburgh in the nomenclature of these two species, but the Linnean species is quite clearly described as " Euphorbia aculeata seminuda, aculeis geminatis *angulis oblique tuberculatis* superne foliosis " and Linnæus quotes Commelin's figure which exactly agrees with his description. Roxburgh states that Linnæus called both species 'nereifolia' but he does not appear to have seen Commelin's figure]

433. Euphorbia caducifolia, *Haines* (*Indian Forester*, Vol. XL., No 4, p. 154, 1914).

A shrub with milky juice and numerous erect fleshy jointed stems from the root 3—5 ft. high, unbranched, smooth, and terete below, above with black tipped tubercles bearing a pr. of slender stipular thorns ·25″ or less long, soon disappearing. Leaves small, broadly ovate and crisped at the margins when young, very caducous. Involucres solitary or in short 3-nate cymes. Anthers broadly oblong, not at all apiculate, dehiscence longitudinal.

Fls. *Feb.—Mar.* Leaves only appear in the rains.

On sandstone rocks. Balod range, Raipur. Also Pachmarhi.

434. Bridelia retusa, *Spreng.* Kasai, *H.;* Kashi, *Chh.;* Katian, *Mar.;* Kora, *Tel.*

A small, rarely m.-s. tree with long conical thorns on the trunk when young Bark grey flaky in the old trees, moderately thick with a dark crimson blaze. Leaves 4—10″ stiff ell.-oblong or sometimes rather obovate, with strong parallel sec. n. and straight cross tertiaries Fls. small greenish in axillary and spicate clusters. Fr. ·25—·3′ globose, yellowish (or black when over-ripe).

Fls. *Aug.—Oct.* Fr. *Nov.—Jan.* Evergreen.

In all divisions, frequent.
A fair wood. The leaves are largely used for buffalo fodder. The fruits greedily eaten by green pigeons, parrots, etc.

435. Bridelia Hamiltoniana, *Wall.* Kudursi, *Mar.*

A much branched shrub or small tree with slender often drooping brown branches, glabrous (or nearly so) leaves 2—4″ pale glaucous beneath from lanceolate to broadly ovate-obovate or suborbicular with 6—7 rarely 9 sec n. each side (which are often forked near the ends in the broader leaves) and cross tertiaries. Fls. small in axillary clusters. Fr. ·25—·3" diam. ultimately purple blue.

Fls. *Aug.—Sep.* Fr. *Oct.— Dec.*

Dry stony places and quartzite and sandstone rocks. Common in N. and S. Chanda; Laon range (Rai.).

436. Cleistanthus collinus, *Benth.* Garari, *Mar.*; Korsi, *Tel.*

A small or m. s. tree (large, attaining 6 ft. girth in Allapalli—*Donald*), with blackish rough bark and red blaze, distichous orbicular, obovate or broadly elliptic leaves 1—4" glaucous glabrous beneath. Fls. axillary green or yellowish ·25—·3" diam. males clustered, fem. often solitary sessile. Capsules chestnut coloured shining, ·75" diam.

Fls. *Apr.—May.* Fr. following *Mar.—Apr.* Leafless *Mar.—Apl.*

One of the most generally used trees for poles and fences, very durable and not attacked by white-ants. All parts more or less astringent and poisonous. An excellent coppicer.

437. Phyllanthus Emblica, *L.* Aonla, *H.*, *Mar.*; Nelli, *Gondi.*; Usirki, *Tel.*

The fr. is the Emblic Myrabolan.

A small or m.-s. tree with whitish-grey smooth bark, pink blaze and distichous close-set small linear-oblong leaves ·3—·75" long, the branchlets closely resembling pinnate leaves and lateral often deciduous. Fls. minute yellowish densely fascicled in the axils of the new leaves. Fr. globose succulent ·75" diam. with a 6-ridged stone.

Fls. *Feb.—May.* Fr. *Oct.—Apr.* (Often ripe in *Oct.*). Deciduous *Mar.—Apr.*

Common in all divisions. The wood is fairly good. The fr. makes an excellent preserve.

438. Phyllanthus distichus, *Muell.* Star gooseberry.

A glabrous tree with pinnately distichous leaves 1—3″ and globose lobed fleshy fr. with 3—4-celled putamen is cultivated in gardens.

439. Phyllanthus Lawii, *Grah.*

A shrub with numerous erect rigid stems 3—4·5 ft. high, close spreading slender branchlets with distichous crowded sub-sessile small leaves ·25″ long and solitary or few minute pinkish fls. in their axils. Fr. ·12—·17″ diam.

Fls. and fr. *Jan.—Mar.*

Often gregarious along the banks of rocky rivers with a constant water-supply. Throughout the circle.

Numerous other small species of Phyllanthus occur with woody bases to their stems, or annuals.

440. Kirganelia reticulata, *Baill.* Syn. Phyllanthus reticulatus, *Poir.* Pitouri, *Mar.*; Pulser, *Tel.*

A scandent or sub-erect shrub with usually sarmentose pubescent branches, the subtending bract of a twig and its two stipules are sometimes converted into recurved thorns. L. ·5—1·75″ rarely 2″, pinnately arranged, elliptic or oblong glabrous or pubescent with 6—8 sec. n. each side. Fls. small green campanulate usually 1 male and 1 female, axillary or sub-racemose. Berries small, black, 2″ diam.

Fls. *Dec.—May.* Fr. *Feb.—June.* More or less deciduous.

Common in hedges along valleys, etc., in all divisions.

Very variable. An erect form, very pubescent, with orbicular or broadly elliptic leaves ·5" and with 3—5 sec. n. only, occurs in N. Ch.

Key to Glochidion.

Anthers 3. Leaves pubescent or tomentose ... velutinum.
Anthers 4—6 rarely 3). Leaves glabrous
Capsule 6 8-lobed . ... lanceolarium.
Anthers 5—6. L. glabrous or nearly so.
Capsule not lobed (the endocarp is 5-lobed) ... zeylanicum.

441. Glochidion lanceolarium, *Muell.*

A small glabrous tree, or flowering as a shrub, with grey striate smooth bark, delicate pink blaze, reddish wood, green rather flexuous and angular twigs, glabrous dark green shining leaves and small axillary fls, the fem. green campanulate 1—3 or more together sessile, the males yellowish ·12—·25" diam. numerous, on capillary pedicels 2—·75" long. Capsule orbicular depressed lobed ·6—·75" diam. and 5 - ·6" long.

Fls. *Mar.—May.* Fr. *Sep.—Jan.* *New shoots in Mar.*

Chiefly in valleys near streams. Lormi forests (Bil.) rare.

This is the extreme western limit of distribution of this species in this latitude.

442. Glochidion zeylanicum, *A Juss.* Arwiganer Chetu, *Tel.*; Recha, *Mar.*

A small tree with dark bark, shining ovate, ovate-lanceolate, ell.-oblong or oblong-lanceolate leaves mostly 4 - 6" but attaining 9 by 3·75' with rounded or cordate often unequal base and acute apex, 5—8 sec. n. each side, short stout petiole and small subulate hardened stipules ultimately deciduous. Fls. in axillary or extra-axillary sub-sessile or *stalked* clusters. M. and f. in same clusters. M. ·25″ diam., yellowish, green or reddish, on pedicels ·25″ long. Fr. ·25—·3″ diam., depressed globose, epicarp not lobed, beaked by the style, rupturing before the deeply 5-lobed endocarp.

Fls. *Mar.—May*. Fr. *Nov.—Dec.*

Along streams. Mohauli range (N. Ch.); Ahiri; Dabatota and Sironcha (S. Ch.).

443. **Gochidion velutinum**, *Wight.*

A small tree with all parts pubescent or tomentose. Bark brown and rough. Blaze crimson. L. ell.-oblong or oblong-lanceolate with usually somewhat unequal cuneate base, rarely ovate or with sub-cordate base, 3—6·5″, with 4—7 prs. strong sec. n. and cross tertiaries Petiole ·25″. Stipules persistent subulate. Fls. axillary solitary and clustered. M. yellow on pedicels ·25—·5″. F. green, pedicels ·1″, capsule ·3″ diam., depressed pubescent lobed, usually sub-sessile.

Fls. on new shoots *Apr.—May*.

In all divisions. Common on the plateaux in Balaghat and in Bilaspur, elsewhere scattered.

The wood does not appear to be used.

444. **Flueggia microcarpa**, *Blume.* Kudursi, Vorpithoni, *Mar.*; Dengala, *Chh.*

A glabrous straggling shrub attaining 12 ft., with light-coloured bark, thin elliptic or more often obovate or orbicular leaves 1—3" long, glaucous beneath with 4—8 slender sec. n. each side usually raised beneath and slender petiole ·12—·25". Fls. minute on capillary peduncles ·17—·25' long in axillary clusters. Fr. either with white fleshy epicarp ·3' diam. or dry ·12—·17" diam.

Fls. *May—Aug.* Fr. *July—Sep.* Evergreen. New leaves in *May.*

In all divisions. Common in the moister valleys of South Chanda and Raipur.

445. Putranjiva Roxburghii, *Wall.*

A handsome m.-s. tree with drooping branches, bifarious broadly lanceolate leaves 1—3·5" inclined forwards, often with a wavy or somewhat serrate margin. M. fls. in numerous minute yellow axillary heads or contracted racemes. F. fls. green 1—2 axillary with large stigmas. Drupe ellipsoid hoary ·6" on pedicels ·5—·75'.

Fls. *Mar.—Apr.* Fr. *Jan.—Feb.* Evergreen.

Amjhar nala, Dhaba range (S. Ch.).

446. Antidesma Ghæsembilla, *Gaertn.*

Jhondri, *Mar.;* Pulser, Pulcher, Polari, *Tel.*

A large shrub or small tree up to 18" girth with broadly ell.-oblong or orbicular leaves, 2—4·5" rarely attaining 6 by 3·5", hoary tomentose when young, more or less pubescent or villous beneath when old with 3—6 strong sec. n. each side; petiole ·17—·5". Fls. minute pedicelled in densely tomentose panicled spikes ·75" to 2·5" in fruit.

Fr. red to black compressed globose to oblong ·2″ seated on the hairy 5—7-fid. calyx.

Fls. *May—June.* Fr. *July—Oct.*

All divisions chiefly in open forests.

447. Antidesma diandrum, *Roth.* Katma, *H.*; Amrol, *Chh.*; Ghondurli, *Mar.*; Sabheli Baji, Amuri, *Gondi.*

A large shrub 6—12 ft. usually glabrous except the shoots, with obovate-lanceolate or somewhat rhomboidly elliptical leaves usually 1·5—3·5″ rarely 5′ long, acute or acuminate with cuneate base and 4—5 sec. n each side. Fls. minute green in mostly simple spikes. M. 1—2″ long. F. often 3″ in fr. Fr. sub-globose, under ·2″ diam., with slightly compressed or rugose keeled stone.

Fls. *May—June.* Fr. *Nov.—Jan.* Leaves turning red *Jan.—Mar.* before falling.

Valleys. Bh; N. Ch; S. Ch.; Bil.; probably in all divisions except, perhaps, Wardha. The young leaves are eaten.

448. Jatropha Curcas, *L.* Retanjot, *H.*; Rani Jhara, *Gondi.*

A large shrub or small tree with glabrous (exc. when young) 3—5-angled or lobed leaves 4—7″ diam. and small greenish-yellow fls. with a campanulate 5-lobed corolla in terminal cymose panicles.

Fls. *May—Oct.* Deciduous.

Very common in village hedges. The oil of the seeds is a violent purgative and emetic.

449. Jatropha gossypifolia, *L.*

A shrubby plant often purple in colour, with thick branchlets, 3—5-lobed or partite leaves 3—8″ diam. with the margins, long petioles, and stipules covered with glands. Fls. small, red, in terminal cymes.

Fls., fr. *r. s.* Deciduous.

Common in waste ground, semi-naturalised.

Several species of Jatropha with coral-red or crimson fls. form handsome garden plants in the C. P., but require some shelter from the hot winds in April.

450. Givotia rottleriformis, *Griff.*

A small stellately tomentose tree with stout branches and soft wood. L. up to 10″ long and broad, cordate, sinuate-toothed 5—9-nerved woolly or tomentose. Fls. diœcious in panicled cymes.

Mr. Donald states that it occurs in Cherla and Bastar.

451. Codiaeum variegatum, *Blume*, is one species of the evergreen brightly coloured shrubs termed 'crotons,' so commonly cultivated, though, on account of the dry hot winds, they will not do well in the open in the Southern Circle.

452. Acalypha colorata, bicolour, hispida, &c (Vasanti, *Vern.*; Copper leaf, *Eng.*), form large handsome garden shrubs.

453. Acalypha indica, *L.*, and A. malabarica, *Muell.*, are herbaceous and occur as weeds. They are of no orest importance.

454. Mallotus philippinensis, *Muell* Sinduri, Kamela, *H.*; Kuku Bacha, *Mar.*; Korku, *Gondi*; Kumkam, *Tel.*

A tree 20—30 ft. branched low, with ovate or rhomboid acute or acuminate leaves 3—5″ (attaining 9″ exceptionally) long covered beneath when young with a greenish-yellow glandular pubescence and permanently with small red glands. Fls. racemed. Capsule densely covered with red glands.

Fls. *Oct.—Nov.* Fr. *Feb.—Mar.*

Occasional in moist valleys in all divisions. Frequent in Rai. and S. Ch.

The red glands from the capsules form the Kamela dye.

455. Homonoia riparia, *Lour.* Taniki, *Tel.*

A large shrub with numerous erect branches from near the root and long willow-like leaves 3·5—10″ densely lepidote beneath. Fls. in long axillary spikes. Capsule ·2—·25″ tomentose.

Fls. *Mar.—Apr.* with the young shoots. Fr. *May—Sep.* Deciduous.

Along rocky and sandy river-beds. Scattered throughout the circle but local.

456. Homonoia retusa, *Muell.*

A smaller shrub than the last with obovate leaves 1—2″ long cuneate at the base and more or less toothed. Fls. in short spikes. Capsule ·1—·15″.

Fls. *Dec.—Mar.*

Along rocky river-beds Only noted from N. and S. Ch. and N. Waid., but probably in all the Western and Southern Divisions.

457. Ricinus communis, *L.* The Castor-oil, with large palmately nerved leaves, is frequently cultivated.

458. Gelonium lanceolatum, *Willd.*

A small straight much branched quite glabrous tree with smoothish grey-brown bark and rather hard flesh coloured blaze. Twigs green. L somewhat pellucid-punctate, oblong oblanceolate with rounded tip 2—5′ long, thick, shining both sides, petiole ·1—·2′ long, the nodes with an annular stipular scar. Fls. minute green in few fld. leaf-opposed clusters. Fr. 3-lobed ·5—·75″ diam.

Fls. *Jan.* Fr. *Dec.*

Along dry sandy nalas in Sironcha. Probably the northernmost limit of this species.

459. Baliospermum axillare, *Bl.*

A stout undershrub with numerous erect herbaceous shoots from the root, variously lobed, sinuate or serrate leaves from very broad suborbicular 10″ diam. to elliptic, oblong or (upper) lanceolate, 3—5-nerved at the 2-glandular base, sec. and cross tertiaries strong. Fls. greenish fascicled axillary or in leafless racemes. Capsule ·3″, 3-lobed, pubescent.

Fls., fr. *Dec.—Mar.* Sub-deciduous or dying down to the root in *Mar.*

In all divisions, under shade.

460. Tragia involucrata, *L.* Agya ka Bhond, *Mar.*

A climber with stinging hairs, leaves 1—4′, the lower often (var. cannabina) 3-fid., all coarsely toothed. Fruiting sepals pinnatifid.

Fls., fr. *July—Dec.*

Frequent in hedges, etc.

LX.—ULMACEÆ.

Flowering before the leaves. Fruit samaroid Holoptelea.
Flowering with the leaves. Fruit small drupaceous ... ... Trema.

461. Holoptelea integrifolia, *Planch.* Karanji Pipal, *H.;* Papra Wavuli, *Mar.;* Namli, *Tel.*

A large tree somewhat resembling a beech tree, with light-coloured smooth bark, thick and flaky when old. Blaze cream-coloured streaked with light brown. L. 1·5—4″ ell. or somewhat ovate or obovate entire, or coarsely crenate or serrate towards the apex, often cuspidate, young pubescent. Petiole ·3—·75′. Fls. very small green in numerous fascicles or short racemes on the leafless branches. Fr. samaroid.

Fls. *Mar.—Apr.* Fr. *May.* Leafless at the time of flowering.

N. W.; N. Ch., frequent; S. Ch., frequent; Dhiri-Mangli forest (Bal.); probably also in other divisions.

Even large trees sometimes have the leaves serrate in South Chanda. The branches are lopped for cattle fodder.

462. Trema orientalis, *Blume.* Juliki, *Tel.;* Baihar, *Bhumia;* Ghatari, *Mar.*

A fast growing small tree with light bark marked with stipular scars, ovate-lanceolate acuminate or caudate serrulate leaves 3—6″ long, silky or silvery beneath, with a 3—5-nerved base. Fls. in small axillary cymes.

Fls. and fr. *Nov.—Apr.*

Near streams, Allapalli (S. Ch.); Lormi forests (Bil.).

463. Trema politoria, *Planch.* Nai dodhara, *Gondi.*

A small tree somewhat resembling the last but the leaves are rather shorter and stiffer and less acuminate, scabrid *both* sides; and though somewhat hairy beneath not silky nor silvery. Upper surface usually shining.

Fls. *Aug.—Sep.* Fr. *Mar.* Evergreen.

In waste or rocky places. All divisions but local. Often on the sides of newly-made roads. Leaves used for polishing.

LXI.—MORACEÆ.

A.	Male fls. in minute heads. Fem. solitary axillary	Streblus.
B.	Fls. concealed inside fleshy receptacles figs)...	Ficus.
C.	Fls. covering the outside of fleshy receptacles ...	Artocarpus.

464. Streblus asper, *Lour.* Karasni, *Mar.*; Baranhi, *Tel.*

A small tree with tough stringy bark, rigid very scabrid (both sides) rhombic ell. or obovate leaves 1·5—4″, often somewhat toothed and acuminate, petiole very short. Fls. mostly from above the leaf scars. Male in very small heads which are ·25-·3″ diam. Fem. (on separate trees) solitary with wo very long styles. Fr. small yellow fleshy (coriaceous pericarp enclosed in the tubular perianth) ·2″ diam.

Fls. *Mar.—May.* Fr. *May—June.*

In all divisions, chiefly near nalas.

The leaves are much browsed. The juice is slightly milky in the cold weather. The twigs are used for tooth-brushes.

Key to Ficus.

All figs have milky juice. The abbreviation 'recept.' is used for the special receptacles or figs. containing the flowers and fruits.

A. Recepts. cauline or rameal, clustered or on special scaly more or less leafless branches ; rarely also a few in the leaf axils.

I.—Leaves some or all opposite.
  Recepts. fascicled ... ... hispida.
II.—Leaves all alternate.
  L. more or less ovate or oblong ... glomerata.
  L. semi-sagittate ... ... Cunia.

B. Recepts. 1—2 (sometimes more in gibbosa, infectoria and Tjakela) axillary, or from the scars of fallen leaves.

I.—Recepts. stalked.
  (*a*) Shoots and leaves more or less scabrid, pubescent or tomentose. Sec. n. 3—5 prs. only above basal.
    1. Large woody epiphytes, rarely becoming independent trees.
      L. broad sub-rhomboid ... gibbosa.
      L. ell. or ovate .. ... Var. cuspidifera.
    2. Creeping pubescent shrub ... heterophylla.
    3. Small cultivated tree ... ... palmata.
  (*b*) Shoots and leaves quite glabrous (Recepts. sometimes pubescent in infectoria).
    L. oblong or oblong-ovate, base not cordate ... ... infectoria Var. Lambertiana.
    L. broadly ovate, base cordate or rounded ... ... Arnottiana Var. courtallensis.
II.—Recepts. quite sessile.
  (*a*) Shoot and leaves quite glabrous. Recepts. not on tubercles, 1—2 rarely more in infectoria).
    1. Petiole 1—3" long or one-third the length of blade.
      † Stipules ·5" long or less.
        L. 3 - 6", oblong or oblong-ovate, sub-membranous, not punctulate nor tuberculate ... infectoria.

L. 3·5—5·5″ ovate, coriaceous, punctulate when green, minutely tuberculate above when dry	Tsiela.
†† Stipules over ·5″.	
L. as above acute or with short obtusely cuspidate apex sec. n. 7—10 (each side). Base not cordate ...	Tsiela.
L. 5—6″ as in Tsiela but tapering gradually to acuminate tip. Sec. n. 3—6. Base not cordate .	Rumphii.
L. ovate with well marked acuminate cusp. base cordate .	Arnottiana
L. ovate with long caudate cusp half as long as rest of the blade, base usually rounded	religiosa.
2. Petiole short, less than 1″. Intermediate nerves nearly as strong as secondary. L. 1·5—3″ rarely 5″	retusa.
(*b*) Shoots and leaves pubescent or tomentose, or if glabrescent petiole short and sec. n. few and strong. Recepts. not on tubercles.	
L. with persistent tomentum, a gland on midrib above base beneath. Recepts. grey tomentose ...	tomentosa.
L. nearly glabrescent, eglandular. Recepts. red	bengalensis.
(*c*) Shoots and leaves glabrous or pubescent. Recepts. several, clustered on tubercles	Tjakela.

465. **Ficus gibbosa,** *Blume.* Gasti, *Gondi.*

A large epiphyte frequently becoming an independent tree, with large sub-rhomboid, mostly unequal-sided, leaves 2·5—8″, very hispid above pale pubescent beneath with 4—5 prs. prominent sec. n. above the 3-nerved base. Recepts. stalked.

Fls., fr. *Feb.—Apr.*

On old buildings, trees, etc., Bh. (Partabgarh fort, etc.); Rai.; Bal. (Sonawani range, Baihar plateau, etc), frequent.

466. Ficus bengalensis, *L.* Bar, Bargat, *H.;* War, *Mar.;* Bareli, *Gondi;* Marri, *Tel.* The Banyan.

A very large tree, sending down aerial roots from the branches, usually starting life as an epiphyte Shoots pubescent. L. ovate to ell. 4—8" entire with 3—7-nerved rounded or subcordate base, old glabrous or usually pubescent beneath. Petiole ·5—2". Stipules ·75—1". Fr. sessile scarlet in prs., ·5—·75" diam.

Fr. *Mar—May* and *Dec.—Jan.* Nearly evergreen.

In all divisions, wild and often planted. A well-known tree easily propagated by large cuttings several inches thick). Useful for elephant fodder.

467. Ficus tomentosa, *Roxb.* Son Pakar, *H.*

A large or small tree with tomentose or woolly stout branchlets and frequently with thin aerial roots. L. very variable in size 2—8·5"; easily recognised by the more or less persistent tomentum and prominent venation beneath, by the cordate base and a longitudinal gland on the midrib beneath.

Fls., fr. all the year. New recepts. appear in *June.* Nearly evergreen.

Usually among dry rocks. In all divisions. On the tops of quartzite cliffs, Bawanthari range (Bh.).

468. Ficus retusa, *L.* Gadasi, *Gondi.*

A small or large tree usually epiphytic when young, with rotund, obovate or elliptic leaves 1·5—3" (up to 5" in one form) always with cuneate

3-nerved base and very slender sec. n. about 5—12 each side with intermediary nearly as strong. Petiole ·25—·5". Recepts. ·2—·4" diam. sessile, white or purple.

Fls. *Feb.—May.* New recepts. appear in *Nov.*

Near nalas N. Ch. and Rai., frequent (on rocky hills near Ghatula, Raipur, and on Satbhaini Hill, North Chanda, a small tree with very erect branches); Bhandara, frequent; Bil.; S. Ch., rare—(Donald).

469. Ficus religiosa, *L.* Pipal, *H.;* Rai, *Gond;* Rage, *Tel.* The Peepul tree.

A large glabrous tree starting life as an epiphyte. This is the true 'Peepul' which may be distinguished from other figs, sometimes confounded with it by the ovate-rotund leaves with the very long caudate tip one-third to half the entire length of the leaf.

Fls., fr. *Mar.—June.*

Common in all divisions and often on buildings. Branches much lopped for fodder and the fruit eaten.

470. Ficus Arnottiana, *Miq.* (sometimes called Pipal).

A glabrous shrub or small tree with broadly ovate leaves 4–7" long somewhat resembling those of 'Peepul' but shortly suddenly caudate or cuspidate, the cusp not exceeding ·7". Base always *cordate* one strong and 1—2 much weaker nerves each side of the midrib. Petiole about half as long as the leaf or more. Recepts. usually paired globose ·3—·5" diam. when ripe, sub-sessile or shortly stalked, faintly verrucose.

Fls., fr. *Mar.—June.* Deciduous *Apr.* New leaves bright red.

Chiefly on rocks and dry hills.

Bh. ; S. Ch. Probably in all divisions.

471. Var courtallensis.

L. ovate, mostly 3·5—4″ only, base rounded or slightly cordate, or somewhat cuneate on the petiole, 5—7-nerved with the petiole 2·5—3″ or as long as the blade. Recepts. only ·28—·3″ diam., when ripe verrucose, flushed red, pedicelled slightly umbonate.

Fr. ripe *Dec.—Jan.* Leaves turn copper coloured in *Dec.*

On the top of quartzite cliffs in the Bawanthari range (Bhandara .

472. Ficus Rumphii, *Bl.* (sometimes called Pipal).

A small or m.-s. tree with ovate or broadly ovate leaves 5—6′ long gradually tapering to the finely acuminate tip and with straight, obtuse or retuse base hardly ever sub-cordate but shortly decurrent on the petiole. Surface closely minutely punctulate when green, showing as minute tubercles above when dry. Petiole one-third to three-fourths as long as the leaf much shorter and stiffer than in the Peepul. Recepts nearly always paired sessile, globose to oblong obovoid ·5″ diam.

Fls., fr. *Nov.—April*, falling in *r. s.*

This tree seems to me not to be epiphytic and is usually found near dry water-courses in Chota Nagpur. Rare in C. P. (Bll.).

473. Ficus Tsiela, *Roxb.* Pakhar, *H.*

A low or large spreading tree often epiphytic, "sometimes sending down aerial roots like a Banyan."—*C. G. Rogers.* Bark white. Blaze with a thin chlorophyll layer, then pink or red or banded pink and white. L. 3·5—5·5″ coriaceous ovate or narrowly ovate with rounded or cuneate or oblique base and very short bluntly cuspidate or acute apex, translucent punctate when green, showing minute tubercles above when dry. Sec. n. 1—2 close to the base each side and about 8—10 prs. above, with weaker ones between. Petiole 1·5—3″. Recepts. about ·5″ diam. globose or globose-pyriform from a broad base, 1—2 axillary or from leaf scars, sometimes deep purple in all stages of development, in other specimens white.

Fls., fr. *Dec.—Feb.*

Common, usually on alluvial soil. Bawanthari range (Bh.); Balod and Dhamtari range (Rai.); N. Ch.; S. Ch.

[Rather variable. In some forms theinnovatoins and recepts. are pubescent. The sepals of the female flower are described in F. B. I. as ovate and shorter than the achene. I find them often obovate and as long as the achene. Mr. C. G. Rogers' interesting specimen grown in deep alluvial soil near the Tapti river in Nimar had aerial roots One Chanda specimen had acuminate leaves 7″ long, thus looking somewhat like F. Rumphii.

474. Ficus infectoria, *Roxb.* Pakhar, *H.*; Jurvi, *Tel.*

A m.-s. or large tree, always epiphytic at least when young. Leaves 3—6″ much thinner than in F. Tsiela, sub-membranous, mostly oblong or oblong-ovate, less often ovate, rather abruptly shortly acuminate, surface finely reticulate with raised nervules but *not* tuberculate when dry, base rounded or sometimes sub-cordate or narrowed, 3- rarely 5-nerved, other sec. n. 5—10 each side, looping within the margin. Petiole slender 1·5—2·5″ rarely 3·5″ long (in exceptionally large leaves). Recepts. sometimes pubescent, mostly paired ·25—·3″ diam. or sometimes ·5″ globose but without the broad base of Tsiela and often (var. Lambertiana) peduncled, whitish or flushed with red.

Fls., fr. *Dec.—June.*

In all divisions rather common.

475. Ficus Tjakela, *Burm.* Kel, *Mar.*

A m.-s. or large tree with stout dark grey branches, coriaceous leaves 3—7·5′ oblong-ovate or ovate or oblong shortly abruptly acuminate with broad rounded or sub-truncate or cordate base which is only 3- (rarely 5-) nerved, margin often undulate, sec. n. 5—12 prs. very finely reticulate between. Petiole 1·5—2·5″. Recepts. small, only ·2″ diam. in clusters of 2—6 *on nodose tubercles* mostly at the scars of fallen leaves, rarely only 2 in the cluster. Basal bracts 2-fid.

Fls., fr. *Feb.—Mar.*

476. Var. rupicola, *Haines.*

The typical plants are quite glabrous, have oblong or oval leaves which are beautifully glossy above. Sec. n. 7—12 each side. In variety 'rupicola' the innovations are densely pubescent, bracts more or less silvery pubescent and young recepts. tomentose, the leaves are oblong-ovate, or ovate, not at all glossy above, scarcely glabrescent beneath, and sec. n. 5—7 each side only. The fls. are similar.

On quartzite rocks, Satbhaini pahar, N. Chanda.

477. Ficus heterophylla, *L. f.*

A creeping pubescent shrub with membranous entire or lobed coarsely toothed or repand leaves 2—5′ long, scabrid both sides, and solitary axillary peduncled recepts.

"In the bed of the Pranhita river, S. Ch."—*Donald.*

478. Ficus hispida. *L. f.* Katamba, *H.*; Budumar, *Chh.*; Katumbar, Dherumber, *Mar.*; Thedu, *Gondi*; Bameri, *Tel.*

A tree 15—25 ft. high with thick hollow branchlets, easily distinguished from all the preceding figs by some or all of its leaves being opposite, ovate-oblong, 4—12″ long, scabrid or hispid. Recepts. 1″ diam. numerous fascicled on both the trunk and the branches or on special leafless drooping branchlets but sometimes also axillary.

Fls., fr. *Jan.—Feb.*

Moist places and often in the village hedges. Bil.; Bal.; N. W.; Rai.; S. Ch.; doubtless in all divisions. Bark yields a fibre, fruit eaten.

479. Ficus Cunia, *Ham.* Dumba, *Gondi*; Buidumar, *Chh.*

A small or m.-s. tree easily recognised by its large shortly petioled leaves 6—15″ long with a *semi-sagittate* base. Recepts. ·5—·75″ diam. in prs. or clusters on long (often several feet) usually leafless drooping branches especially near the root.

Fls., fr.-chiefly *May—June*, also *Aug.—Sep.* Evergreen.

Moist ravines. Paraswara (Bal.); Lormi forests (Bil.); Rai. Fruit eaten.

480. Ficus palmata, *Forsk.*

A small erect tree with general habit of the true 'Fig-tree' but with hoary or pubescent branches and the leaves tomentose beneath usually entire. Cultivated in Nagpur and other places, native of Upper India.

481. Ficus glomerata, *Roxb.* Gular, Dumba, *H.*; Umbri, *Mar*; Toya, Atti, *Gond.*; Moidi, *Tel.*

A m.-s. tree with thick crown, ovate, ovate-lanceolate or ell. dark-green leaves 4—7·5" narrowed to an obtuse or sub-acute tip, pale and pubescent on the nerves beneath, base rounded rarely acute 3-nerved. Petiole ·75—1·75" pubescent. Recepts. 1—1·5" diam. reddish, globose or pyriform pubescent on cauline and rameal special branches usually short (but sometimes 2 ft. long); occasionally axillary recepts. are found as well.

Fls., fr. *May—June.* Often deciduous *Oct.—Nov.* Renewing its leaves *Dec.—Jan.*

Common in all divisions and preserved in village lands for its fruit, which is largely eaten.

482. Artocarpus Lakoocha, *Roxb.*

A m.-s. tree with large ell. or ovate obtuse or shortly acuminate leaves 6—10" long, pubescent or tomentose beneath, with 8—12 sec. n. each side. Petiole ·5—1". Male inflorescence ellipsoid or globose 1" diam. deciduous. Female inflorescence irregularly sub-globose 2—4″ diam. fleshy in fruit.

Fls (and new leaves) *Apr.* Fr. *May.*

Along shady flowing streams among the hills of the Lormi forests (Bil).

The fruit is eaten. The tree is frequently planted.

483 Artocarpus integrifolia, *L.* Kathal, *H.*

The jack-fruit. It is often planted but does not grow well in the circle, the climate being too dry.

LXII.—URTICACEÆ.

484 Bœhmeria platyphylla, *Don.* Var. macrostachya, *Wedd.* (sp.).

A shrub 4—6 ft. with large ovate leaves 5—10″ long very coarsely toothed and with strong basal nerves. Diœcious. Male fls. clustered on long sub-erect spikes reaching 16′ long. Female on short spreading spikes 2—3′ long.

Fls. *Sep.—Jan.*

Ravines of the Lormi forests, Bil., elev. 1,500—2,000 ft.

LXIII.—SALICACEÆ.

485. Salix tetrasperma, *Roxb.* Wandra, *Mar.*

A tree with fluted bark and thin pink blaze or in some forms a shrub, with silky-pubescent shoots, lanceolate acuminate sometimes cuneate-serrate leaves 1·5—3′ long, pale glaucous beneath with 10—20 very fine sec. n. each side (nervules not at all raised beneath from which it may easily be distinguished from Homonoia). Diœcious.

Both male and female fls. in slender spikes on the new shoots.

Fls. *Feb.* with the new leaves. Fr. *Mar.* Deciduous.

Along Garvi nala, Bhandara ; N. Ch. ; streams in the Lormi forests (Bil.).

CLASS—MONOCOTYLEDONEÆ.

LXIV.—ZINGIBERACEÆ.

A. Lateral staminodes broad.
Flowering spike surmounted by a coma of coloured bracts ... ... Curcuma.
B. Lateral staminodes small or O or adnate to the lip. Flowering spikes dense but not surmounted by a coma of bracts.
Filament short not petaloid ... ... Zingiber.
Spike terminating the leafy stem Z capitatum.
Spike from the root ... Z. Casumunar.
Filament petaloid bearing the anther on its middle ... ... Costus.

486. Curcuma longa, *L.* Tawkir, *Mar.*

The fls. of this plant have not yet been seen and the identification is uncertain. Tubers were collected by Mr. Beechey and Mr. Cole, these sent up leafy shoots the first year but they did not flower before I left India. The root-stock is long, cylindrical ·75—1" diam. or roundish conical and branched, colour light grey-yellow.

They are used in the preparation of native sweetmeats, and 'Tawkir' is included in the leases for "Minor Forest Produce." Several species of Curcuma grow in the forests but good specimens are still required. They flower in the rains.

487. Zingiber capitatum, *Roxb.* Ran ala, *Gondi*, is common in all divisions.

488. Zingiber Casumunar, *Roxb.*, common in Raipur.

Fl. *r.s.* Fr. *Nov.* They do not appear to be used.

489. Costus specious, *Smith*, is a handsome herb, often with spiral stem, and bearing large white flowers at the top.

LXV.—MUSACEÆ.

490. Musa sapientum, *L.* (Var. sylvestris, *Prain.*). Jangli Kela *H.* The wild plantain.

A tree-like herb 8—12 ft., bracts of the inflorescence deep red or purple, arranged on an elongate drooping spike, the females at the base of the spike, the terminal bracts forming a dense club. Fr. with a coriaceous rind and numerous black seeds. Valleys in the Lormi forests, elevation 1,000—2,000 ft.

LXVI.—AMARYLLIDACEÆ.

A. Small plants, with plicate leaves, small yellow flowers, and tuberous root-stocks.

Ovary produced into a stalk below the perianth	Curculigo.
Ovary not produced into a stalk (not in list)	Hypoxis.

B. Bulbous plants with lily-like leaves and flowers.

Filaments free	Crinum.
Filaments united by membrane or corona...	Pancratium.

491. Curculigo orchioides, *Gaertn.* Kali Musali, *H.*; Musar Kand, *Gondi.*

A small plant with bright yellow star-like fls. just thrust above the ground by the elongating hypanthium ('perianth-tube'). L. often very small at the time of flowering, linear-lanceolate plicate, up to 12″ long. Capsule with a short beak 4-seeded.

Fls. *May—Aug.* Dies down in the cold season.

Common in all divisions.

Tubers of Musar Kand obtained by Messrs. Beechey and Cole were in long cylindrical root-like pieces about ·3—·5″ diam. They are often included in leases of "Minor Forest Produce" and appear to be used as a tonic.

492. Crinum latifolium, *L.*, is a handsome plant with umbels of large white or pinkish fls., 8—9″ long. Found on the plateaux.

493. Crinum ensifolium, *Roxb.*, also with umbels of white fls., but with much narrower petals, is common along the river banks.

494. Pancratium longiflorum, *Roxb.* Panjan Kanda, *Gondi.*

Bulb bottle-shaped or globose up to 2·5″ diam. with a long neck and with membranous brown skin. Fls. white 1—2 on the scape, the slender tube 4·5—6″ long and lobes lanceolate 2—2·5″. The stamens are connected by a membrane into a cup about ·1—1·5″ long, divided into 6 oblong 2-horned segments.

Fls. *June.*

Bhandara, Balaghat, etc.

Two kinds of bulbs have been received by me under the name of Panjan Kanda, the second failed to flower and was apparently a species of Eulophia. Panjan Kanda is included in the leases of "Minor Products" but why it is collected is not clear. Pancratium is used as a size by Koshtis who make hand-woven cloth.

LXVII.—DIOSCOREACEÆ.

Several of the species of Dioscorea have fleshy bulbils in the axils of the leaves which the natives call 'phal,' the real fruits, however, are 3-winged coriaceous capsules. The vernacular names are very loosely applied as even the forest races sometimes confuse the species, unless they actually dig up the tubers. Fuller descriptions are given in the "Forest Flora of Chota Nagpur."

Key to Dioscorea.

A. Leaves digitately compound. Capsule oblong.
  L. 3-foliolate. Lfts. about 6′, 4—6-costate .. dæmona.
  L. 3—5-foliolate. Lfts. about 3″, 1—2-costate pentaphylla.

B. L. simple.
  I.—Male spikes spreading clustered or whorled on an elongate rachis, mostly under 3″ long. Capsule usually as broad as long.
  (*a*) Buds oblong. Sepals oblong.
    1. More or less pubescent all over. Fem. spikes panicled . ... anguina.
    2. Glabrous. L. glaucous beneath. Fem. spikes not panicled.
      L. pale glaucous. M. petals obovate. Cross-nervule obscure ... .. oppositifolia.
      L. dark glaucous. M. petals ell.-oblong. Cross-nervules conspicuous • ... bellophylla.
  (*b*) Buds globose. Sepals orbicular or ovate-oblong (exc. alata).
      Stem terete. M. spikes straight ... aculeata.
      Stem winged. M. spikes zigzag .... alata.
  II.—Male spikes very slender drooping and panicled.
      Sep. linear in both sexes. Capsule oblong bulbifera.

495. Dioscorea dæmona, *Roxb.* Baichandi, *Mar.* (This name is a reliable one); Tikhur, *Gondi;* Dukarkand, *Mar.* (*f. Donald*).

A climber with 3-foliolate leaves, lflts. about 7·5′ long, 5—6-costate, more or less obovate. The stems have a few small prickles below. Capsules large, oblong 1·5—1·75″.

Fls. *July—Sep.* Fr. *Sep.—Jan.*

In all divisions, common.

According to Roxburgh the rhizome is dreadfully nauseous even after boiling. Mr. Donald says it is not eaten in South Chanda. It is sub-globose, or irregular up to 12″ diam., marked with eyes and covered with root fibres and slightly poisonous. After frequent washing it is said to be sometimes eaten, and is used in the C. P. for making several kinds of sweetmeats. It is included in leases of "Minor Forest Products."

496. Dioscorea pentaphylla, *L.* Musalkanda, *Vern.* (but see also Curculigo); Padimuskir, *Gondi*; Pandigada, *Tel.*

A much more slender plant than the last with 3—5-foliolate leaves and the leaflets only about 4″ long, rarely attaining 6″. The stem prickly below. Capsules oblong ·75—1″.

Fls. *Aug.* Fr. *Nov.—Feb.*

In all divisions. Leaves in one form pubescent or hairy and the bulbils sub-globose, faintly tesselated, in another glabrous with elongate or pyriform bulbils. Sometimes said to be eaten or used as a tonic.

497. Dioscorea bulbifera, *L.* Mataru, *Mar.*

Stems smooth from a large brown sub-globose rhizome covered with eyes and roots. Leaves simple sub-orbicular to broadly ovate and cordate abruptly caudate 7—11-costate with very distinct cross-nervules. Sepals linear. Capsule oblong.

Fls. *July—Sep.* Fr. *c. s.*

All divisions very common. Rhizomes acrid, but sometimes eaten after repeated washings of the starch.

498. Dioscorea alata, *L*, is the commonly cultivated yam.

499. Dioscorea aculeata, *L.* Pindigida, *Tel.*

Stems very stout, somewhat thorny below and characterised by the hard, thick bases of the petioles which are also sometimes thorny. Tubers elongate 1—3 ft. and 2—4" girth, usually rising directly from the base of stem. L. mostly alt. sub-orbicular to broadly ovate with a large basal sinus and usually cuspidate. Sepals, oblong-ovate. Capsule, 1·5" diam. broader than long.

Fls. *Nov.—Dec.* Fr. *Jan.*

500. Dioscorea belophylla, *Voight.* Pitaru, *Vern.* (Bil.); Kuru Kanda, *Vern.* (Nagpur); Nand Kand or Kandar, *Gondi* (Bal.); Jangli Matol, *Mar.* (S. Ch.); Gundia, *Tel.*

Stems quite smooth, enlarged at the base into a small rhizome, bearing tubers at the ends of long fleshy fibres; these tubers are sometimes 2 ft. long and are very deep in the ground. L. opp. and alt. sap-green, dull above, glaucous beneath, usually ovate and deeply cordate with well-marked cross-nervules (even when fresh) between the costæ beneath, the latter decurrent into the petiole. Sepals nearly free, oblong obtuse dotted and with scarious margins. Capsule 1" broad.

Fls. *Sep.—Nov.* Fr. *Dec.—Jan.*

Bilaspur (common); Bal.; N. Ch.; S. Ch.; N. W. (?).

The most highly prized of all the forest yams and very deep pits are sometimes made in the forests to get at the tubers.

501. Dioscorea oppositifolia, *L.* Syn. D. nummularia, *Lamk.*; D. glabra, *Roxb.* Girs Kanda, Sut Kanda, *Gondi*; Gilandru, Choratogu, *Mar.*

Stems smooth or with numerous small prickles below, enlarged at the base into a small rhizome and bearing tubers as in the last 5—12″ by 1—2″ diam. Leaves opposite, rarely also alternate, glabrous, pale glaucous beneath, usually ovate oblong, and cordate below, base of oblong upper leaves often rounded, straight or cuneate. Male spikes whorled ·5—1·75″ long and often copiously panicled. Base of perianth broad and pulvinate. Sep. oblong. Petals obovate spathulate. Capsule, 1—1·25″ broad, often stipitate.

Fls. *Sep.—Oct.* Fr. *Nov.—Dec.*

In all divisions.

Var. (oppositifolia, F. B. I., p. 292). Less coriaceous. More or less pubescent. Leaves said to be never cordate.

I am unable to separate as two species *glabra* and *oppositifolia* by the characters usually given, but there are two forms, one with small flowers in lax spikes, the other with larger flowers in dense close spikes.

The tubers are eaten.

502. Dioscorea anguina, *Roxb.* Bansera, *Gondi*; Pindigada, *Tel.*

Stem unarmed, soon thickening into a cylindrical tuber 1—more ft. long which is often palmately branched. L. opp. very broadly cordate-ovate below, upper ovate.

Easily distinguished from the other species by the thin leaves, somewhat shiny below, being very pubescent when young and pubescent on the nerves beneath even when old. Panicles tomentose or pubescent. Capsules tomentose or glabrescent.

Fls. *Sep.—Jan.* Fr. *Dec.—Jan.*

In all divisions, common.

LXVIII.—LILIACEÆ.

A. Climbing and more or less prickly. Fls. small white.	
Leaves large 3–5-nerved. Fls. in umbels ..	Smilax.
Leaves replaced by linear or acicular cladodes	Asparagus.
B. Climber with tuberous roots and leaves ending in a tendril-like tip. Fls. showy...	Gloriosa.
C. Tuberous herbs with white star-like flowers in racemes .	Chlorophytum
D. Bulbous herbs with greenish or purple flowers in lax racemes.	
Seeds flattened	Urginea.
Seeds sub-globose	Scilla.

503. Smilax macrophylla, *Roxb.*

A stout prickly climber with stipular tendrils on the young shoots and large, 6—12″ long and broad, elliptic or orbicular usually 7-costate shining leaves Fls. small white in umbels, umbels 1—3, rarely 5, in axillary cymes. Berry globose red when ripe.

Fls. *Apr.—June.* Fr. *Nov.—Jan.*

Not uncommon in the damper valleys.

504. Smilax prolifera, *Roxb.*

A stout prickly climber with stipular tendrils on the young shoots and ell., rarely ell.-ovate, leaves with the sheath winged and wing more or less auricled one or both ends. Umbels in axillary and terminal panicles 3—6″ long with usually a zig-zag rachis.

Fls. *Feb.—Apr.* Fr. *Nov.*

Ravines in the Lormi forests (Bil.).

505. Asparagus racemosus, *Willd.* Sahaora, *Maria;* Sahan sarmohi, *Mar.;* Satawari, *Gondi;* Narbod, *Vern.* (*f.* Graham).

A slender, sarmentose shrub or climbing by means of the reflexed spines on the stems, with annual woody shoots and acicular somewhat curved, 3-quetrous cladodes, usually in threes on the short branchlets. Fls. small white, about ·13" diam. on filiform articulate pedicels on very short racemes. Berries, ·2' diam. scarlet.

Fls. *Sep.—Nov.* Fr. *Oct.—Dec.*

Frequent in the forests, in all divisions.

506. Chlorophytum tuberosum,* *Baker.* Safed Musali, *H.*; Ganjagata, *Gondi.*

A pretty herb with fleshy tubers, a tuft of lanceolate-linear leaves, 6—9" long, and a simple or somewhat panicled raceme, 8—18" high of pretty white fls., with sub-erect and spreading perianth leaves, ·5" long.

Fls. *Apr.—June.*

Frequent, especially on the plateau land in Balaghat and Bilaspur. Safed Musali appears in the market in white dry pieces, ·5—2·5" long and ·25" thick. They swell in water to a cylindrical fusiform shape, and are said to be used (like Kala Musali) as a tonic.

507. Gloriosa superba, *L.* Chora tige, *Tel.*; Karkari, *Vern.* (Graham).

A well-known and a very beautiful plant, 3—10 ft. high with a large torulose tuberous root-stock, lanceolate leaves, 6" long, with the tip more or less converted into a tendril, and large, red and yellow fls. with crisped petals.

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* This was named by me C. arundinaceum in the first list. Mr. Hole pointed out that C. tuberosum is common in the C. P. Unfortunately I kept no specimens but it is more likely to be *tuberosum* or one of the other Deccan species.

Fls. *July—Oct.* Dies down in the cold season.

In all divisions, in hedges, etc.

The roots and seeds are poisonous. Graham says that the root is used in Nagpur for dressing glands.

LXIX.—PALMÆ.

508. Borassus flabelliformis, *Willd.* Tal, Tali, *H.*; Potu Tadi Chetu (male); Penti Tadi (female), *Tel.* Palmyra Palm.

A beautiful and well-known tree attaining 60 ft. with a crown of large fan-shaped leaves.

Frequently cultivated and often self-sown.

The stalks of the unripe inflorescences, after cutting the latter, yield toddy (Tari, tadi). The unripe seed, pulp of the fruit, and the seedlings are eaten.

509. Phœnix sylvestris, *Roxb.* Shindi, Khajur, *H.* Wild Date Palm.

A well-known palm with greyish-green pinnate leaves, 7—12 ft. long. Fr. 1—1·5″, orange.

Frequently cultivated and often self-sown. Tapped for toddy. Leaves used for matting, etc.

510. Phœnix acaulis, *Buch. Ham.* Jangli Khajur, Sindhi, *H.*; Eita, *Tel.*

Stems hardly any, or thick and ovoid, covered with persistent leaf bases; lflts. fascicled, not in one plane; lowest reduced to sharp spines. Spadix 6—10′, elongating to 1—3 ft in fr. Berry red or yellow finally black.

Fls. *Apr.—May.* Fr. *May.—June.*

In all divisions. Especially on open grassy hills subject to frost, on clay schists with quartz, and on laterite. Also very common on clays or clay-producing rocks in Sironcha.

511. Calamus Guruba, *Ham.* **Var.** Bent, *H.;* Tika, *Tel.*

A short sub-erect (in its depauperated condition?) or extensively climbing slender cane, the stem-sheaths armed with numerous flat spines, ·25″ long, the spines on the petioles often 1″ straight and spreading with shorter recurved ones. Sheaths sometimes with long flagellæ armed with hooked spines covered, with a rusty tomentum, mouth of sheath with a scarious ligule 1·5—2″ long, which is leaf opposed and often split. L. 3—4 ft with 25—30 prs. of lflts. Lflts. linear acuminate about 8—10″ long. Primary spathes at first tubular covering the partial inflorescences and ultimately split open and laminar, linear oblong, with entire not lacerate mouth Fls. and spikelets inserted at or above the mouth of their respective spathels Fr. ·25″ diam., yellow, beaked, scales with a brown border and scarious margin.

Fls. *Dec.—Jan.* Fr. *Jan.* of the following year.

Marshy valleys. Sironcha, S. Chanda, the canes are much cut out.

[NOTE.—The Central Provinces plant differs from the type by its very slender habit, short partial inflorescences, pyramidal in shape and not exceeding 4″, slender, short straight, not zig-zag, spikelets]

LXX.—TYPHACEÆ.

512. Typha angustata, *Chaub.* Pangavat, *Vern.* (*f.* Graham.)

A tall bulrush, bearing a brown cylindrical dense spike of minute fls.

Fls. *Apr.*

Marshy places

Used for stuffing elephants' gaddies, etc.

LXXI.—CYPERACEÆ.

A. Spikelets with few or many glumes. Lower one or two empty, uppermost male or empty, intermediate glumes 2-sexual.
  I.—Flg. glumes many distichous. Hypogynous bristles O.
    Style 3-fid. Rachilla of spikelet persistent ... . Cyperus.
  II.—Flg. glumes many spirally arranged. Hypogynous bristles present.
    Leaves O. Style base articulate ... Heleocharis.
    Leaves present. Style base passing gradually into the fruit ... ... Scirpus.
B. Spikelets 1-sexual or with one basal fem. flower and one or more male or empty glumes. Fruit white or pearly, very hard. Hypogynous bristles O ... ... Scleria.

513. Heleocharis plantaginea, *Br.*

An erect grass-like but stiff herb, consisting of flowering and barren stems but no leaves, septate when dry. Spikelets solitary terminating the stem, green to brown, of very many glumes. Nut polished smooth, crowned by the tumid articulate style base

Fls., fr. *Sep.—Dec.* Perennial.

Wet places, gregarious. Chanda, Raipur. Said to be used for stuffing.

514. Scirpus grossus, *L. f.* **Var.** Kysoor, *Roxb.* (sp.). Kesar, Kesara, *Chh.*

A very large sedge with 3-winged stems, 4—6 ft. high and very long spongy leaves up to 1" broad. L. 3—4 ft. long soft, without cutting edges, somewhat translucent with numerous minute transverse lines (cell-walls). Leaf-like bracts at the top of the stem 3, up to 18" long. Panicle decompound of corymbose cymes, 3—4" long, branches sub-erect, angled, scabrid, the final ramifications racemose. Nut 3-gonous smooth, brown.

Fls., fr. *Sep.—Dec.* Perennial.

Raipur along margin of tanks. The stoloniferous root-stocks bear black tubers which are said to be very good eating and are a source of food. The Chhattisgarhi name is very similar to the Bengali from which Roxburgh derived his specific name of the plant.

515. Scleria annularis, *Kunth.* Surya, Chhuria, *Maria*, has been twice sent from different ranges in Bilaspur as a fodder grass.

Scleria pergracilis, *Kunth.* Baligawat, *Mar.*; Mangaligadi, *Tel.*; has been sent as a fodder grass. It is lemon-scented. Fairly common.

516. Scleria psilorrhiza, *C. B. Clarke*, with the same names as the last.

A more robust plant than the other two and also said to be a fodder grass.

Chanda. (There are no specimens at Kew from India proper and Mr. Turrill was good enough to identify the plant.)

All these species of Scleria are grass-like herbs with unisexual fls in brown spikelets easily recognised in fruit by the pearl-white or pure-white shining nutlets, ovoid smooth ·1" long in S. annularis and ·15" long in S. psilorrhiza. In S. pergracilis the nut is under ·1" ovoid and somewhat trigonous and tubercled.

517. Cyperus rotundus, *L.* Motha, Batha-bijir, *Mar.*

It is a common weed occurring as a pest in gardens. The tubers are used in the case of fever, dyspepsia and dysentery and in other diseases. They are said to be tonic and stimulant.

LXXII.—GRAMINEÆ.

[NOTE.—Only the commonest and most striking grasses, and those common on the sample grass areas, are here described. In the limitation of the genera, especially of the Andropogon group, I have followed Mr Stapf, to whom I am indebted for assistance.]

Detailed descriptions of the glumes have not usually been given as being outside the scope of a 'list,' but identification of most of the grasses cannot be depended upon unless such descriptions are referred to. From vernacular names Forest Officers cannot expect to obtain even as much assistance in the case of the grasses as for the trees and the shrubs. They are absolutely unreliable, and on collating the names collected by myself with those recorded by Duthie (Fodder Grasses) and Graham (List of Grasses, 1913), I have come to the conclusion that practically the only really useful names are 'Mushan' for good fodder species of Iseilema and 'Gonyar' or

'Tatian' for the more or less useless grasses, generally of the genus Anthistiria and Apluda. On the utility of species for fodder my results are sometimes at variance with those of Mr Duthie who records many species as good for fodder which I have repeatedly heard described as useless by the natives. As the people are apt to call all grass good for fodder, especially when so young, that they cannot discriminate the species, and as most young grass is eaten by cattle, I think decided opinions as to the *inutility* of certain species, coupled with the fact that they may often be seen left untouched on lightly grazed areas, more valuable than contrary statements that they are good for fodder.

A.—BAMBOOS.

518. Dendrocalamus strictus, *Nees.* Bans, *H.* The Male Bamboo.

This is the common bamboo. It occurs principally on the hills in Balaghat, Bilaspur and South Chanda, and has been rendered very nearly extinct through over-cutting in Nagpur, Wardha and the more accessible parts of Bhandara The two-year rotation hitherto adopted is certainly too short. The finest bamboos occur in the Sonawani forest, on metamorphic rock.

Fls. sporadically every year in *Nov.—Dec.* Deciduous.

519. Bambusa arundinacea, *Willd.* Katang, Katang Bans, *H.*

A very large densely cæspitose bamboo with numerous horizontal branches below, which, as well as many of the other branches, are armed with recurved thorns

Fls. gregariously and periodically.

Along muddy streams and rivers, chiefly Balaghat and Raipur, but it is found in all divisions. Rare in Nagpur-Wardha.

B.—GRASSES.

The glumes in a spikelet are numbered I, II, etc., proceeding from the lowest and outermost.

Series Panicaceæ, Cp. p. 242.

Spkts. *articulate* on their pedicels below the lowest glumes, *or* deciduous with their pedicels (exc. Arundinella). Glumes only 3—4 in each spkt. and only 1—2 bearing flowers (stamens or pistil or pale). *If 2 flower-bearing, then only the upper one* fertile.

A. Rachis of the spikes bearing the spkts. not articulate. Gl. IV (or III where there are only 3 glumes) coriaceous or herbaceous, often polished and hardening round the pale and seed. Spkts. sometimes paired. Cp. p. 238.

I.—Spkts. *articulate* on the tops of their pedicels or on the rachis of the spike when sessile, usually 2-fld.

(*a*) Spkts. awnless, not involucellate.
Spkts. dorsally flattened, secund on a broad often winged rachis. Glumes 3 (I is absent) ... Paspalum, p. 242.
Spkts. usually spicate or panicled. Glumes 4; gl I much smaller than the others, gl iv glabrous Panicum, p. 243.
Spkts. minute in very large panicles. Glumes 4, I and II minute. Gl. iv hairy ... ... Thysanolæna, p. 243.

(*b*) Spkts. with one or more of the glumes awned, not involucellate.
Spkts. panicled in pedicelled pairs. Gl. iv, the smallest, base bearded ... . Arundinella, p. 244.

(*c*) Spkts. surrounded by an involucel of bristles which is persistent after the spkt. falls ... Setaria, p. 244.

II.—Spkts. deciduous with their pedicels, 1-fld.
  Spike slender, spkts. very narrow.
    Gl. I and II awned ... Perotis, p. 244.

B. Rachis of the spike or spikes bearing the spkts. articulate (not easily disarticulated in Imperata). Gl. iv never coriaceous or hardening round the seed, often reduced to the base of an awn. Spkts. (or at least the male when spike is 1-sexual) 2-nate or 3-nate usually one sessile and the other of the pair pedicelled. (In Arthraxon and Ophiurus the pedicelled spkt. is rudimentary or absent.) Cp. p. 237.

I.—Spkts. 1-sexual. Males in a separate inflorescence, or in a distinct part of the inflorescence above the female portion of the spike and dissimilar to it.

Male spikes in terminal panicles, females in stout sheathed spikes with very thick rachis (The Maize plant) ... ... Zea.
Fem. spkts. 1 or few at base of the spike and enclosed in a saccate bract which is ultimately white polished and of stony hardness through which the male part of the spike projects ... ... Coix, p. 245.
Spkts. in bracteate spikes. Lower part female. Gl. I of fem. spkt. wrapping round the others and becoming hardened in fruit (margin never completely closed as in the bract of Coix) ... ... Chionachne, p. 245.

II.—Spkts. 1- and 2-sexual, sexes *not* in distinct sections of the inflorescence (but lowest spikelets all male in Heteropogon and Dichanthium), one spkt. of the pair sessile usually 2-sexual, the other (or other two when 3-nate) pedicelled and usually male or neuter, or both 2-sexual and pedicelled (Imperata, and var. pedicellata of Pollinia articulata). Spkts. not sunk in the excavate joints of the rachis of the spike. (Somewhat sunk in the wavy rachis in Ischæmum spp.).

(*a*) Both spkts. pedicelled and similar.
  Spkts. awnless in a dense spiciform silvery panicle ... Imperata, p. 246.

(*b*) One spikelet sessile, the other pedicelled. Both similar in sex and form.

1. Spkts. awnless in large silky panicled spikes ... ... Saccharum, p. 247.

2. Spkts. awned in geminate, digitate or panicled villous or hairy spikes (rarely a few solitary) gl. iv minute, hyaline, simple or cleft, as short as the ovary or reduced to the base of the awn ... Pollinia, p. 246.
Gl. iv conspicuous, longer than ovary, usually cleft into 2 lanceolate lobes ... ... Ischæmum, p. 247.

(*c*) One spikelet sessile, the other pedicelled or one sessile and 2-pedicelled. Sessile and pedicelled dissimilar in form or sex. Sessile awned. Pedicelled often imperfect (sometimes O in Arthraxon).

1. Spkts. in solitary spikes terminating the stems.
Pairs of spkts similar to one another. Sessile spkt. 2-fld. awned. Ped. spkt. awnless ... Ischæmum (laxum), p. 249.

Lowest pairs of spkts. all male and awnless. Upper pairs with sessile spkts. female long-awned, pedicelled male or neuter and awnless, very different in form ... Heteropogon, p. 260.

2. Spkts. several or many in spikes which are geminate, digitate or fascicled at the end of the stem or branches.

Spikes not sheathed by spathaceous bracts.

Pairs of spkts. similar to one another. Sessile spkts. 2-fld. Gl.

I flat 2-keeled with inflexed margins. L. narrow ... Ischæmum, p. 247.

Pairs of spkts. dissimilar, the lowest 1—4 prs. male Sessile spkts. 1-fld Gl. I 2-keeled. L. narrow ... ... Dichanthium, p. 255.

Pairs of spkts. similar. Pedicelled rudimentary or O. L. short broad and cordate ... ... Arthraxon, p. 250.

Spikes geminate with common peduncle sheathed by spathaceous bracts, spikes and bracts panicled. Slender ·5—3 ft. peduncle inserted. Unscented ... .. Andropogon (pumilus), p. 252.

Stout 3-5 ft. Peduncle included. Scented ... . Cymbopogon, p. 261.

3. Spkts. in long or short spikes panicled Spikes or branches of the panicles, arranged singly or in successive pairs or whorls along the more or less elongated main rachis of the stem or branch.

Spikes consisting of many spikelets. Not at all woody. Panicle branches or spikes opposite or whorled. Gl I of sessile spkts. without long ciliæ above, not muricate ... Andropogon (intermedius), p. 253.

Woody below. Panicle branches or spikes alternate. Gl. I of sessile spkts with long ciliæ above, not muricate ... Andropogon (Grahami), p. 255.

Roots scented. Branches of panicle whorled. Gl I and II of sessile spkts. muricate ... Vetiveria, p. 258.

** Spikes at the end of the long slender branches of the panicle of *few* spkts. or a single triplet (one sessile and 2 pedicelled).

Tips of the branches of the panicle bearded (easily seen after the fall of the spike) ... ... Chrysopogon, p. 259.

Tips of the branches of the panicle not bearded ... ... Sorghum, p. 256.

4. Spikes in bracteate clusters. Clusters panicled.

* Spkts. in bracteate 1-jointed spikes each consisting of one 2-sexual spkt. sessile on the bulbous base of the short rachis, 1 empty basal sessile spkt. and 1 male or neuter terminal spkt., the whole subtended by an awned bract and seated on a slender pedicel, pedicels several in a cluster with often reduced spkts., these again in spathes of a lower order ... Apluda, p. 251.

Spkts in very short spikes surrounded by an involucre of 3–4 male or neuter bract-like awnless spkts. which are in a whorl or superposed pairs. Spikes with their involucre in clusters subtended by spathiform bracts or leaves and clusters panicled.

Involucral spkts. persistent, rest of spike deciduous ... Anthistiria, p. 262.

Cluster (of spike and its involucre) jointed below the involucre and the whole deciduous together ... Iseilema, p. 264

III.—Male and fem. spkts. not in distinct parts of the inflorescence.

Spkts. sessile in the excavated joints of the rachis, in cylindrical spikes. Pedicelled spkt. sometimes rudimentary or 0.

Spkts. 2-nate. Pedicel of pedicelled spkt. often adnate by one margin to the joint of the rachis ... Rottbœllia, p. 251.

Spkts. with the pedicelled spkt. altogether absent ... ... Ophiurus, p. 252.

Series Poaceæ, Cp. p. 237.

Spikelets *not* articulate on their pedicels or deciduous with them, but the rachilla of the spikelet articulate above the lowest glumes. Glumes often more than 4, the 2 lowest usually empty but the lowest of the flower-bearing glumes fertile, uppermost often male or neuter.

A. Glumes only 3, I and II empty, III 2-sexual. Spkts. narrow, panicled, awned, the awn with 3 slender arms ... Aristida, p 267.

Small creeping grass. Spkts minute unilateral on 3—6 digitate spikes. Gl. III broader than I and II, awnless ... Cynodon, p. 269.

B. Glumes many, very narrow Spkts. panicled, 3—7 flowered. Very large stoloniferous grass Panicle 1—2 ft. Base of flg. glumes with long silky hairs ... ... Phragmites, p. 267.

C. Glumes very many, broad. Spkts. laterally compressed many flowered. Flg. glumes 3-nerved imbricating, deciduous from the rachilla. Empty glumes shorter than the flg. and 1-nerved Eragrostis, p. 268.

520. Paspalum scrobiculatum, *L.* Kodo, *H.;* Kodela (Bil.).

One to three ft. high with fibrous roots and erect leaves. Spikelets oval in two rows along a flat rachis.

Fls. *Oct.-Dec.*

Common, wild and also cultivated for its grain

521. Paspalum longiflorum, *Retz.*

Similar but with very long slender spikes and small black shiny seeds.

On the Bilaspur sample plot.

522. Panicum indicum, *L.* Bandarpuchli *Vern.* (Bil.).

Stem 1—2 ft., leaves very narrow, spikelets ·1″ or less in slender spiciform inflorescences 1—4″ long, not confined to one side of the rachis, often purplish.

Fls. *Oct.*

Very common in wet places, bare of trees.

Numerous other species of Panicum occur but none of the commoner ones are typical *forest* grasses. Some like forms of Panicum prostratum, *Lamk.*, and P. punctatum, *Burm.*, occur in heavily grazed areas, the leafy stems have assumed a habit, closely appressed to the ground, which makes it difficult for animals which have no upper front teeth to grasp them.

523. Thysanolæna Agrostis, *Nees.* Phulbari, *Gondi.*

A very large grass 5—10 ft. high, somewhat resembling a miniature bamboo, with large broad flat distichous leaves often 18″ by 2″ and large decompound panicles, often 3 ft. by 2 ft. of innumerable minute spikelets.

Fls. *May.*

On shady slopes; but especially along ravines and water-courses in the hill forests of Balaghat and Bilaspur. It is used for brooms.

524. Arundinella setosa, *Trin.*

A cæspitose slender grass 3—4 ft. high with tufted stoloniferous roots-tock, smooth stems, flat and involute setaceous acuminate leaves 6—8″ long on the stems and not over ·25″ broad. Spikelets ·25″ in unequally pedicelled prs. on slender racemes 3″ long; racemes on a panicle 3—5″ long.

Fls. *Sep.—Oct.*

A rather common grass on the hills. Used for brooms but not apparently for fodder.

525. Setaria glacua, *Beauv.* Rala, *Mar.*; Neori, *Chh.*

Spikelets in a dense terminal spike 2—3″ long and ·3″ thick, with numerous brown spreading bristles rising from the pedicels of the spikelets.

Fls., fr. *Nov.*

A grass coming up spontaneously in Kodo fields and eaten but not common in the forests. "A fairly good fodder."—*Graham.*

526. Perotis latifolia, *Ait.* Maria Buch, *Gondi.*

A prostrate and ascending small grass branched from the root 12—18″ high, conspicuous from its long feathery spikes, the slender often purple spikelets having each two slender awns several times longer than themselves. Stem leafy with oblong-lanceolate leaves only ·5—1″ long with bristly base.

Fls., fr. *Nov.—Dec.*

A plant characteristic of over-grazed areas on very sandy soil and not, apparently, eaten by cattle.

527. Coix gigantea, *Stapf.* Syn. Coix Lachryma-Jobi, *L.*, var. gigantea (F. B. I.). Rakshi, *Mar.;* Bous, *H.*, *Mar.;* Kasai, *Gondi.*

A very large perennial grass 5—8 ft. high with ascending large leaves up to 1" broad, very shortly hairy, the hairs often with tubercle base. Spikes with a solitary female in the leaf axils with or without a terminal male portion protruding from the convolute bract. This bract of the female spikelet becomes white shiny and of a stony hardness when ripe. Male portion of the spike often very long-peduncled with close ternate spikelets. The large outer glumes form 6 imbricate rows and are oblong with broad wings.

Fls. *Sep.*

Along streams. Eaten by buffaloes.

528. Chionachne barbata, *Br.* Syn. Polytoca barbata, *Stapf.* (F. B. I.) Karpia, *Chh.*, *Gondi;* Bous, Kosai (through confusion with Coix); Rakshi *(Bil.);* Karsali, Krima jalaran, *Vern.* (*f. Graham.*)

A very large grass 5—8 ft. high, somewhat resembling the last, clothed below with deciduous pungent bristles. Stems straw-coloured up to ·2" diam. Nodes with rings of deciduous hairs. Lower cauline leaves 2—3 ft. long, ·5—·7' wide, smaller upwards, densely hairy with tubercle-based hairs and edges spinulose.

Panicle branches several from each axil, long naked 4—12" long bearing a foliaceous bract with several peduncles and often branches which again bear bracts, peduncles and branches of a higher order. Peduncles each with a proper obovate truncate bract with the keel ending in a *long cusp or awn*, bract many-nerved densely ciliate. The fruiting female bract is somewhat similar to that of Coix but is only coriaceous and never completely closed on one side, so that the lowest joint of the articulate rachis of the spike is visible in the grove. The male portion of the spike usually consists of 3—5 prs. of spikelets only, but sometimes up to 15 spikelets occur.

Fls. *Aug.—Oct.*

A very common grass, especially on cotton soil, occurring most abundantly in blanks and open forest and becoming a nuisance after felling operations. It is useless for fodder.

529. Imperata arundinancea, *Cyrill.* Phulya, *Vern.*; Lotan, *Gondi.*

A sub-gregarious strong-growing grass 1—4 ft. high with numerous underground stolons, erect leaves attaining their full height after flowering and fruiting and much exceeding the flowering stems, coarse, striate, glabrous, ·5″ wide. Flowering stems about 1 ft., with a closely sheathing leaf and dense, beautifully silvery-hairy spiciform panicle.

Fls. *Mar.—Apr.* Usually coming up abundantly after the grass fires.

Chiefly on the Balaghat and Bilaspur plateaux, especially where wet. *Also in other divisions, extending to Sironcha* where it is frequent on the cotton soil.

530. Pollinia argentea, *Trin.* Danka, Chundi, *Vern.*; Mothi marvel, Gunti, *Vern.* (*f. Graham*); Kandi (Bal. *f. Duthie*).

A tall slender tufted grass 4—5 ft. high with flat leaves 1—2 ft. long and spikelets in 5—10 shortly racemed (sub-digitate) yellow brown villous spikes with long awns, becoming silvery with age Lower leaves 6—12′. Spikes 3·5—7″ long, spikelets geminate, close, sub-secund on the rachis.

Fls. *Oct.—Nov.* Fr. *Nov.—Dec.*

A common grass on dry or stony soil in open forest. Very common in Sihoa Rai, along the Silauria river, etc. Sometimes sub-gregarious on cotton soil. "Said to afford an excellent fodder when young."—*Duthie.*

531. Saccharum spontaneum, *L.* Kans, *H.;* Padgar, *Vern.* (*Graham*).

A perennial grass 4—6 ft. high with stout root-stock and solid stems. Easily recognised by its long very narrow hard leaves with incurved or rolled up margins and white silvery narrow fragile panicles 1—2 ft. long with the callus hairs many times as long as the small spikelets.

Fls. *Aug.—Oct.* Fr. *Sep.—Dec.*

In swampy or wet soil and along water-courses. Also as a weed on cotton soil. Graham states that cows eat it when green and that it makes a good silage. It is sometimes used for thatching.

532. Sacchrum officinarum, *L.*, is the sugar-cane. Cultivated.

533. Ischæmum rugosum, *Salisb.* Badaul, *Gondi;* Băhadaur, *Chh.;* Tor, *Vern.* (Nag. & Rai.).

An annual grass about 2—3 ft. high with yellowish spikes, single or mostly paired at the ends of the branches, 1—3″ long. Stems often reddish and waxy below the lower nodes which have a ring of deciduous hairs. It is readily distinguished by the broad glume being glabrous at the back above and corrugated in the lower half or two-thirds.

Fls., fr. *Oct.—Dec.*

In open ground but chiefly in fields, old 'bewars,' etc. The grain is eaten and it is a good fodder.

534. Ischæmum angustifolium, *Hack.* Sum, *Mar.;* Nulka Jari, *Gondi.*

The 'Babar grass' of Northern India, the 'Sabai grass' of Chota Nagpur and 'Baib' of Calcutta.

A tufted often gregarious grass 1—2 ft. high with long drooping wiry leaves when old, clothed with wool at the base of the tuft. Rootstock stout Very young leaves flat and erect, soon becoming drooping and involute, ultimately harsh, and attaining 3 ft. in length with a filiform tip, glabrous except at the ciliate mouth of the sheath and the ligule of the hairs Spikes 1 - 3" long 1—4 terminating slender often branched peduncles, rachis clothed with dense yellow or brown hairs at the joints which almost conceal the spklt. Spklts. ·16—·3" long with hard callus and 1—2 very fine awns.

Fls. *Feb.—June.* Fr. *May—July.*

Chiefly on the rocky hills in Balaghat Abundant in mica and horn-blende schists on the Baihar Ghats in poor forest. Granitic and metamorphic hills in Sylari Khapa forest (N.W.); Sihawa, etc. (Rai.); Ghot and Markhanda forests (S. Ch.) on metamorphic rocks; Bilaspur, chiefly in the Lormi hills.

It probably nowhere occurs in sufficient quantities in the circle to make it important for paper, but it is largely used locally for rope-making.

535. Ischæmum pilosum, *Hack.* Kunda, *Vern.* (*J. Graham*).

Rootstock creeping with the stolons and shoots covered at the base with dry striate leaf sheaths. Stems 2—3 ft. stout. Leaves flat or convolute. Spikes 2—6 on the stout peduncle. Pedicels and the joints conspicuously bucciniform, bearded on one face with white long hairs.

Fls. *Nov.*

N. Wardha; Chanda. Probably in all districts.

Graham says "a troublesome weed on black cotton soil" and "a good fodder." —*Lisboa.*

536. Ischæmum ciliare, *Retz.* Suhaga, *Gondi.*

An erect grass or decumbent below, 1—2 ft., tufted, leafy. Leaves linear 2—4" rarely 6' long, the sheaths hairy with tubercled based hairs. Spikes 2—3 on the peduncle, rather stout short 1·5" or up to 3", lower part of the outer glumes bare and coriaceous, upper part grooved and hairy. Awn of glume IV very slender only about twice as long as the spikelet.

Fls. *Nov.*

In sample plot, Raipur; Chanda; N. Wardha. Probably in all divisions.

537. Ischæmum laxum, *Br.* Sedwa, *H.*; Shara, Sheda, *Mar.*; Pendra Jadi, *Gondi*; Telagadi, *Tel.*; Sen, *Vern.* (Bil.).

A tall perennial grass 3—4 ft. tufted on a short stout rhizome and bearing a superficial resemblance to Spear Grass. Stems straw-coloured when ripe, rather slender and constricted at the nodes with the single terminal spikes falling off entirely leaving a truncate end with a short peg-like projection (entirely different from the Spear Grass) on the stem. Leaves flat ·2—·3″ wide and about 6—12″ long, scaberulous, ending in a filiform tip. Sheaths striate with a ligule of silky hairs. Spikes 3—5″ long with secund flat spikelets and the awns about 1·5″ secund. Pedicel of pedicelled spikelets broad flat bearded as also is the rachis, both the pedicel and sessile spikelet adpressed to and partly lying in grooves of the rachis. Outer glume of the sessile spikelet 2-keeled deeply dorsally channeled with 3 green ribs each side and two-tailed at the tip.

Fls. *Sep.—Oct.* Fr. *Nov.*

In all divisions. Common on trap in Nagpur-Wardha and a most *important fodder grass*, eaten by cattle even after the fall of the spikes, but it should, of couse, be cut as early as possible. Also used for thatch.

538. Arthraxon ciliaris, *Beuv.* Basin, *Vern.* (Bil. and Nag.); also Kakya, Leplania (*J. Graham*).

An annual grass with creeping stems and ascending branches 12—18″ high with short ovate or ovate-lanceolate leaves 1—3″ long and very slender peduncles bearing 2—4 short spikes ·5—1″ long with small delicate awns.

Fls. *Oct.*

Forwarded from the sample plot at Bilaspur, but common under shade and said to be a fair fodder.

539. A. microphyllus, *Hochrt.* Lotna, *Vern.* (*J. Graham*), is very similar but a smaller plant in all respects.

540. Apluda aristata, *L.* Syn. A. varia, *Hack.* Tatian, *Vern.* (the name is also applied to Anthistiria); Phulwer, Chidai gode, *Gondi;* Kundha, *Mar.*

A tall perennial grass, often 6—8 ft. high, with a rather stout roots-tock and very leafy stems and inflorescences. Cauline leaves distichous up to 18″ long, smaller upwards, ·3—1″ broad setaceously acuminate, narrowed and sub-petiolate at the base, somewhat rough on the edges and sometimes with a few short hairs along the principal nerves The small spikes, each of three spikelets, are often incurved and each is enclosed in a leafy bract (spathe) ending in an awn. The fertile spikelet also ends in a fine awn. Sessile spikelet attains ·3′.

Two forms are easily recognised in which—

(1) the spikes are arranged alternately along a slender rachis. Panicle very thin:

(2) the spikes are more clustered in the axils of short leaves on the branches of a dense panicle.

Fls. *Sep.—Nov.*

Common in all divisions There is a singular consensus of opinion among the natives in the circle that this grass is quite useless either for fodder or thatch.

Roxburgh's A. geniculata is a small grass which appears to me a perfectly distinct species.

541. Rottbœllia exaltata, *L. f.* Vern. names as for Polytoca, also Bursali (*f. Graham*).

A stout leafy annual grass up to 6 ft. high with leaves narrowed at the base up to 1″ broad and often minute tubercles on the sheath and blade. Easily recognised by the axillary pale cylindrical stout spikes which readily break up into joints and with the green spikelets sunk in the notches. The spike ends in a point consisting of the more or less free ends of spikelets.

Fls. *Nov.*

542. Ophiurus corymbosus, *Gaertn.* Lahi, *Mar.;* Kota, *Vern.* (Bil.); Gunit, Sontha, *Vern.* (*f. Graham*).

A grass 4—6 ft. high with numerous tough tush-like solid stems arising from the bulbous swellings of a horizontal rhizome. Base of stems covered with striate leaf sheaths. Leaves mostly near root, those on stem short 2—4″, margin with stout ciliæ or sub-spinulose. Spikes often purple somewhat resembling in structure those of Rottbœllia but much more slender and usually fascicled in the axils of the upper leaf sheaths, often copiously but laxly panicled.

Fls. *Nov.*

Characteristic of damp cotton soil, especially in open overgrazed forest where, as it is often the only tall grass left, it is obviously unfit for fodder.

543. Andropogon pumilus, *Roxb.* Diwartan, *Vern.* (*f. Graham*); Lal Phuyar, *H.*

An annual grass 6″—3 ft. high, the whole plant *turning red* in *Nov.* and *Dec.* by which it may be recognised. Leaves slender mostly at the base, 2—3″ by ·1—·15″ with compressed keeled sheaths. Spikelets in short geminate spikes ·3—·75″ long, each pr. of spikes on a peduncle about

·5″ long which is sheathed by an acuminate spathe rather shorter than the peduncle. Each spike of about three to six trumpet-shaped joints with as many prs. of sessile and pedicelled spikelets, the sessile spikelets awned. When old the spikelets fall off leaving a pair of toothed cups at the end of the peduncle.

Fls. *Sep.—Oct.*, sometimes *Nov.—Dec.*

A gregarious grass very common in all divisions. On poor trap rock, often the only conspicuous grass. It flowers later on metamorphic rock with better soil. It is said to be sparingly eaten by cattle.

544. Andropogon intermedius, *Br.* Ghonsi (Bil.); Tamb, Bari Kandi (*f. Graham*); Kasi Gadi, Mular (Chanda, *f. Duthie*).

The vernacular names are very uncertain, both ‘Kapi’ and ‘Rakshi’ have been given in addition to the above, but these names belong to other grasses.

An exceedingly variable grass if, as it seems probable they are, several species are not included under this name. All varieties agree in the following respects:—

Perennial grasses 2—5 ft. high with erect culms often with a ring of hairs at the nodes and narrowly linear setaceously acuminate leaves usually 8—12″ long. Spikelets geminate (sessile and pedicelled) equal, at the nodes of slender fragile spikes which are arranged in a simple panicle or on the short branches of a compound panicle, the axils of the branches or spikes usually swollen and with a few hairs, the internodes of the spikes and the pedicels of the pedicelled spikelets densly ciliate, but the main rachis of the panicle between the nodes and its branches and the peduncles of the spikes quite glabrous. Spikelets, often purplish, ·12—·17″ long with 3 oblong glumes and a fourth reduced to an awn. Sessile spikelet with gl. I obtuse or narrowly truncate, its two keels scabridly ciliate towards the top 4—5-nerved between the keels, margin narrowly inflexed. Gl. II as long, lanceolate or oblong, 3-nerved with smooth keel. Gl. III shorter oblong hyaline nerveless. Neither gl. III nor gl IV paleate Awn scaberulous. Pedicelled spikelet rather narrower, gl. I with the keels rigidly scabro-ciliate and more strongly 5—9-nerved, II 3-nerved, III as in sessile spikelet, male or neuter, IV absent.

Fls. usually *Oct.—Dec.*

Throughout the area.

The following varieties are easily recognised :—

(*a*) genuinus.

Panicle oblong 4—7″ long with the rachis much longer than the spikes, internodes of spike and pedicel of pedicelled spikelets compressed with dark line in the centre (translucent by transmitted light). Branches of panicle with one or few spikes. Gl. I of sessile spkt. not pitted, with adpressed silky hairs below the middle but sometimes very few. Leaves on the stem usually 8—12″ by about ·25″ sometimes ciliate towards their base, sheaths smooth but with long hairs at the mouth.

One form from Bilaspur has purple spikes only ·75″ long, opposite and decussate. Another form has pale yellowish spikes 1″ long whorled above, the lower branches with more than one spike.

Hackle's variety "genuinus" has spikes up to 2" long and gl. I depressed along the median nerve.

From Bilaspur to Chanda.

(β) setosus, *var. nov.*

Panicle 6—8", branches with few spikes up to 2·5" long, whorled, gl. I nearly glabrous at the back and the nerves faint. Leaves with tubercle-based stiff hairs both sides, especially below, mouth of sheath with long ciliæ.

Bilaspur. Also Singbhum, a form with smaller panicle and in which the sheaths are densely setose.

(γ) punctatus.

Panicle 3—6", branches with several spikes, gl. I of sessile spikelet with a marked pit.

Chiefly in the eastern divisions.

545. Andropogon Grahami, *Haines.* (Kew Bulletin No. 5 of 1914. p. 189.)

This differs from all the varieties of A intermedius by the 4—8 flexuous purplish spikes 1·5—2" long greatly exceeding the common flexuous rachis and placed alternately thereon. A very coarse grass with culms woody below and much branched from the leaf sheaths, upper nodes hairy, lower sheaths dry open and persistent, leaves linear-acuminate 3—6" glabrous or with few ciliæ towards base. Gl. I of sessile spkts. with long ciliæ above as well as being ciliolate on the keels and the hairs of callus long.

Fls. *May.*

Growing gregariously in 'Bewars' in the Lormi forests, alt. 2,000 ft.

546. Andropogon (Dichanthium) caricosus, *L.* Var. mollicomus, *Hack.* Belia, *Vern.*

A stout or perennial leafy grass 3—4 ft., erect or decumbent below, rather swollen above the nodes and the lower internodes grooved on one side, the upper nodes bearded. Leaves, erect on stem, 6—8" ending in a filiform point, with a few long hairs above the striate compressed sheaths, margins scabrous Spikelets broad, closely imbricate in 4 rows along the rachis of 2—5 spikes which are 2—3·5" long and have very hairy short peduncles arranged in a very short raceme, looking like the inflorescence of Ischæmum.

The sessile spikelets, which are on one side of the spike, are awned. Gl. I obovate or oblong 5—7-nerved, the margins incurved and the two keels with *ciliate wings.*

Fls. *Oct.—Dec.*

All over the western districts in grass Birs, etc. Also Bilaspur, so that it probably occurs in all divisions [The C. P. plant is stouter than the specimens from the southern part of the peninsula and Ceylon and I have never seen it with solitary spikes, var. genuinus, *Hack.*]

547. Sorghum halepense, *Pers.* Syn. Andropogon halepensis, *Brot.* Bharu, *H.*; Bhoru, *Mar.*; Jalaram, *Gondi.*

A very large perennial leafy grass with a creeping rhizome, 5—8 ft. high or even up to 15 ft. in some localities, the long broad leaves with prominent white midrib and scaberulous margins glabrous except near the ligule which is very short or a row of short hairs. Panicle 8—18" long, more or less pyramidal, not dense, with long solitary or 2—3-nate slender branches 2—4" long bearing spikes with only 3—4 prs. (sometimes only a triplet) of spikelets, axils of branches tumid or ciliate, joints of rachis and pedicels margined ciliate. Sessile spkt. ·12—·2" long and gl. I appressed-silky faintly 6-(5—11)-nerved.

Fls. *Nov—Dec.* Fr. *Dec.—Jan.*

Locally along damp valleys, especially along banks of muddy streams. Common in the valleys of Ar nadi, Aivi range (N. Wardha); very common along rivers in Gaikuri range (Bla.), where it attains 15 ft.; dense along the rivers about Nawapara, Laon range (Rai); Allapalli (S. Ch.). It is therefore generally distributed.

Eaten by cattle and sometimes said to be a *good fodder* but, like S. vulgare, is apt to develop, under certain conditions, a poisonous glucoside and is sometimes said to be poisonous till after the rains (*vide* Dr. Leather in Agricultural Ledger). Grain sometimes eaten, and it is believed to be the ancestor of the cultivated 'Jowar.' Stems are used for making pens.

548. Sorghum vulgare, *Pers.* Syn. Andropogon sorghum, *Brot.*, is the cultivated 'Jowar.' After cutting, the new shoots (Karbi) form a most useful supply of fodder, especially in the Western districts, the abundance, or otherwise of which has an important effect upon the sale of grass from the forest.

549. Sorghum serratum, *Haines.* Comb. nov. (As there is a previous Sorghum serratum, *Roem. and Schult.* = Panicum serratum, this name should perhaps be abandoned.) Syn. Andropogon serratus, *Thunb.* (1784); Holcus fulvus, *R. Br.* Prod. (1810); Sorghum fulvum, *Beauv.* (1812). Rathar, *Vern.* (Bil.).

A tall tufted perennial grass 5—6 ft. high, villous at the nodes and with the leaf sheaths villous on one side, leaves with long hairs at the base and often hairy on the surfaces especially beneath. An easily distinguished grass with brown or black shining spikelets in short spikes at the end of filiform sub-whorled branches which are arranged in a sub-simple oblong panicle 6—9" long. Rachis of the spike bearded with brown hairs. Gl. IV of sessile spikelet hairy with a long bent awn, or awn obsolete

Fls. *Oct.—Nov.*

Usually in rocky open forests from Bil. to Chanda

550. Sorghum purpureo-sericeum, *Schweinf.* Syn. Andropogon purpureo-sericeus, *Hochst.*

Somewhat similar to the last but has larger more shaggily hairy spikelets with white or red-brown hairs, sessile spikelets ·3" long (only ·17" in last).

Fls. *Oct.—Nov.*

Less common. Chanda.

551. Vetiveria zizanoides, *Nash.* (in Small Fl. S. E. U. S., 1903) and *Stapf.* (Kew Bulletin, 1906) Syn. Andropogon squarrosus, *L.f.* Kas-Kas, *H.;* Ururi, *Mar.;* Ursuri, *Goudi.* Vetever is the South Indian name.

A tufted perennial grass 3—5 ft. high with stout spongy aromatic roots and rather rigid sub-erect glabrous leaves 1—2 ft. long with scabrous margins. Panicle 6—12" with many-whorled spreading or ascending branches each terminated by a long many-jointed spike. Joints and pedicels filiform with truncate not bearded tip but base of sessile spkt. slightly bearded. Easily recognised by the muricate keels of gl. I and gl II, gl. IV not or very slightly awned.

Fls. *Nov.*

Chiefly on low ground and abundant about the damp ground surrounding tanks The roots form the well-known scented material from which Kuskus tatties are made.

552. Chrysopogon monticola, *Haines* Comb. nov. Syn. Andropogon monticola, *Schult.* Mont. (1817); Chrysopogon montanus, *Trin.* in Sprengel (1820). Malha, *H.*; Tarali, Putku Jadi, *Gondi*; Pandri Ban, Sain, Chirra, *Gondi*, *Chh.*; Pedha Bhusar, *Tel.*

A variable grass best described under the two forms given below. They agree in the panicle consisting of very slender often flexuous whorled or sub-whorled branches which end in a clavate obliquely truncate and cupped bearded tip (best seen on the fall of the spike), and in the single terminal spikes consisting each of only 3 spikelets, 1 sessile and 2 pedicelled, the pedicel of the pedicelled spkt. not half as long as the sessile spikelet.

Fls. *Sep.—Nov.*

(α) *monticola* proper.

Slender tufted grass 1—2 ft., leafy below, base often decumbent, leaves short, 1—2″ acute or obtuse, glabrous, lower sheaths compressed Panicle 2—3″, the main axis filiform above. Spikes about ·2″ long, often purple, with brown hairs on the rachis and pedicels Awns (of gl. IV) 1—3″ long. Pedicelled spkts with or without awns

(β) Var. robustus.

Erect, stout, 3—5 ft. Base of stems densely covered with compressed leaf sheaths. Leaves 6—12″ often with long ciliæ at base with tubercled bases Panicle 4—6″, main axis filiform above Spikes about ·3″ long with dense brown hairs as in the ast. Awn (of glume IV) 1·5—2″ long. Pedicelled spkts. awned.

Both forms are very common, especially on cotton and trap soils. On sandy soils the larger variety has not been observed, but the smaller is common. Grass on laterite often contains a large percentage of C. monticola and Spear Grass. Soils with white clay, when not too heavily trampled, grow C. monticola in association with Apluda and Anthistiria. A fodder grass when young, but from its abundance on grazing areas it would appear not to be one of the favourite grasses.

553. Heteropogon contortus, *Beauv.* Syn. Andropogon contortus, *L.* Sukla, Kusal, *Vern.* (in all districts); Hukda jadi, *Gondi;* Tede gadi, *Tel* Spear Grass.

A perennial leafy tufted grass 1—4 ft. glaucous when young, compressed below and with often keeled sheaths. Leaves 6—18″ long by ·15—·25″ broad, scaberulous above and the margin scabrid. Spikes single 1·4—3″ long ending in the twisted ends of the awns. Lowest several prs. of spikelets male or neuter, imbricate, not awned, and usually persistent after the fall of the fertile spikelets. Upper spikelets heterogamous, the sessile ones fertile with awn 3—5″ long, the pedicelled ones with very short pedicel and more or less concealing the fertile, all with long white tubercle-based hairs. Base of fertile spikelets with a hardened point and a barb of hairs.

Fls. *Sep.—Nov.* Fr. *Nov.—Jan.*

Common in all divisions, especially luxuriant on cotton soil. Frequent on sandy soils, in valley and also found on laterite.

Thrives on a sandy loam. Is a useful though not first class, fodder if cut before flowering It is also eaten by horses and some cattle after flowering, but the fertile spikelets should be cleaned out or they are apt to produce sore mouths.

A good thatch grass.

554. Cymbopogon Martini, *Stapf.* Tikari, *Gondi ;* Rusa, *H. ;* Motia, Sufia, *Mar. ;* Sirra, *Chh.* Lemon Grass.

A stout tufted leafy grass with strong short root-stock.

Base of stems usually bare (not covered with imbricating bases of leaf sheaths), woody. Leaves glaucous or pruinose beneath, narrow or attaining 1·3" broad, the base never narrowed, often cordate or amplexicaul. Spikelets paired in short geminate spikes, the common peduncle of which is much shorter than the spathe from which it arises, prs. of spikelets in elongate strict or branched panicles, usually *sweetly scented,* spathes and often leaves always turning reddish or red with age (hence the name *rusa*).

Fls. *Oct.—Feb.*

All districts, chiefly on rocky hills, also found on cotton soil, but nowhere sufficiently abundant to render the extraction of the oil remunerative, though small leases for its collection are occasionally given.

Two varieties are distinguished by the oil distillers, 'Sufia' giving a good oil and 'Motia' which is worthless. These do not correspond to any structural differences in the plants so far as I can ascertain, and plants with both vernacular names are included under the same variety at Kew.

Graham (List of Grasses, Nagpur and Telinkheri) quotes Andropogon Nardus, *L.*, as common. No description however, is given except that the leaves are narrow and it has no smell. I have never found A. Nardus nor any other oil grass of this section, but Cymbopogon Martini, *Stapf.*, sometimes has narrow leaves and nearly scentless (Motia?).

* Stapf. Oil grasses, Kew Bulletin, 1906), states that Cymbopogon Nardus is only known in cultivation.

555. Anthistiria imberbis, *Retz.* Bhond, *Vern.* (Bil.); Goniar, *Vern.*

A large leafy, often branched, perennial grass 2—5 ft. high. Leaves 3—10" glabrous or sparsely hairy with short ciliolate ligule. The spikelets are clustered in bracteate sub-globose or flattened heads which, excluding the awns and long acuminate tip of the spathes, are about as broad as long. The heads are arranged in large leafy lax panicles. Spathes compressed with bulbous-based setæ along the edges or glabrous. Each head contains several small spikes each with its one small spathe. Each spike has a curious envolucre of four male spikelets, a central fertile spikelet and two male pedicelled spikelets. The pedicelled spikelets are half as long again as the fertile which is polished, white or brown, grooved, cylindrical, hispidulous with short brown hairs at the tip from which projects the long 2" awn, the base is long and pungent.

Fls. *Sep.—Nov.*

Common from Nagpur to Bilaspur.

556. Anthistiria ciliata, *L.f.* Goniar, Gunhar, *Vern.* (all districts); Birain, the variety with fan-shaped fascicles (Bil. ; Lel Gondali (S. Ch.); Tara Gola Jadi, *Gondi;* Tera Gola Gaddi, *Tel.*

A rather short stout leafy, often very gregarious, grass 4—5 ft. tufted from a rather stout root-stock, easily recognised from the clusters of spikelets being arranged racemosely on *short erect usually paired* branchlets, the panicles simple above with alternate clusters. The involucral spikelets are copiously fascicled on the back with tubercle-based hairs. Gl. I of the fertile spikelets wraps round gl. II and is uniformly clothed with sparse very short appressed hairs and minutely dotted, base not pungent but with an oblique scar.

In the F. B. I. it is stated that it very often resembles the ordinary states of A. imberbis but the above form is unmistakable. A form with more fan-shaped fascicles occurs, but it is rarer.

Fls. *Oct.—Dec.*

In all divisions. It is sometimes densely gregarious over large areas (*e.g.*, in the grassy tracts about Nawapara in the Laon range).

It is unfortunately useless either for fodder or thatching although Graham quoting Lisboa) says "Good fodder and hay" and Duthie says (under 'A. scandens') "Used for fodder and for thatching purposes," but it is possible that there is a mixture of species under A. ciliata.

557. Anthistiria laxa, *Anders.* Tatian, *Vern.* (in many divisions); Charha, *Chh.;* Tera Bhusar, Gaddi, *Tel.;* Ginari (N. W.), Goniar (Bal.).

This is also a very distinct species, being a tufted slender, 2—4 ft. high, much branched grass, feathery from the numerous short soft narrowly linear leaves and with many lax leafy panicles of sub-solitary or few small heads on filiform branches. Lower leaves on main stem up to 12", upper 2—4" by ·1" ending in a filiform tip, with few long white soft hairs near the base, sheaths compressed striate, keeled. Heads about ·5" diam. Spikelets of involucre ·2", often reddish, with green glabrous callus, finely ribbed, few long tubercle-based hairs towards the tip. Glume I of fertile spikelet deeply grooved on back. Awn 1·2" long.

Fls. *Oct.—Nov.* Fr. *Dec.* (when the clusters usually turn red).

All divisions; very abundant in the western divisions, often associated with the last, but preferring more sandy moist situations. Gregarious about 4 ft. high over large areas, as in the B class forests about Mukri (S. Ch.). Luxuriant on sandy black cotton ('Bersi Kanhar') soils where the dominant grasses are often A. laxa and A. ciliata with smaller quantities of the Iseilemas. Good for fodder when young only.

558. Anthistiria gigantea, *Cav.*

A very large stout grass up to 10 ft. high and of very different habit from all the last, with flattened stems and leaves 2—5 ft. by ·3—·7". Spikes few in pedicelled drooping clusters terminating the branches of the very large lax panicle, the involucral spikelets are arranged in superposed prs. instead of as a whorl, the 2—3 fertile spikelets in each spike are rufously hirsute.

Fls. *Nov.—Dec.*

Only remarkable from its size, as it only occurs in a few nalas and ravines in Balaghat and Bilaspur, where it is a pest from the pungent barbed fruiting spikelets.

559. Iseilema laxum, *Hack.* Mushan, *Mar.*; Mucheli (Bil.); Menchi Malwa Jadi, *Gondi*; Gurap Malwa, *Tel.*

A very common tufted grass with strong fibrous roots, about 1—3 rarely 4 ft. high, leafy with short leaves, the lower only 4—5·5" and often much shorter, acute or obtuse, about ·15" broad with a strong keel, usually with long ciliæ below and on the compressed sheaths but nodes only hairy towards the inflorescence. Inflorescence of few or many lax narrow panicles consisting of flattened leaf sheaths and their progressively smaller blades bearing fascicles of small peduncled spikes each with their own proper spathe. Proper spathes about ·3" long boat-shaped with scarious margins with the peduncle of the spike ·1—·15" long above base of spathe articulate above the spathe and again at the base of spike. This spike consists of an involucral whorl of 4 male spikelets round a central internode bearing a sessile 2-sexual, and 2 pedicelled male, spikelets. The whole involucre falls off at the articulation below its base (whereas in Anthistiria it is persistent). Sessile spikelet ·2" bottle-shaped, the gl. I narrowly lanceolate 5-nerved upwards and 2-cuspidate (or the two excurrent nerves sometimes united by a thin membrane).

Fls. *Oct.—Dec.*

In all districts but more especially in Nagpur-Wardha and North Chanda on cotton soil. Prefers cotton soil overlying sandstone. It is said to be the best fodder grass in the circle and is largely eaten by cattle green or dry.

[NOTE.—The proper spathes and spikelets ar eoften minutely pubescent.

In another variety the margins of gl. I of all spikelets has long white ciliæ.

White ciliæ are always present at the base of the spike and its nodes. The edges of the sheaths are frequently furnished with long tubercle-based hairs, cp. I. Wightii.

Two common states occur —(*a*) Dwarf, leaves short obtuse, panicle very lax, not at all leafy as the clusters of spikes are remote and their subtending leaves with very short blades; (*b*) Taller and more tufted. Panicle leafy.]

560. Iseilema Wightii, *Anders.* Mushan, Ghod or Ghora Mushan (in the western districts); Malwa Jadi, *Gondi;* Malwa Gaddi, *Tel.*

A tufted very leafy grass 3—4 ft. high with rather short fibrous roots, perennial? Nodes with a ring of hairs. Leaves erect, radical fading 12—15″, cauline from 10″—13″ and mostly under ·12″ wide, strongly keeled, scaberulous above and on edges, with long hairs towards the base and sheaths often copiously white hairy with long tubercle-based hairs, ligule of close long hairs. Panicle strict, or more often, with copious short side branches, the panicle-leaves bearing the spikes, as well as the proper spathes of the spikes, being characteristically furnished along the keels and along the edges with rows of small tubercles. The structure of the spike is as in the last species but (when in full flower) it is much further exserted from its proper spathe, is usually of a characteristic purple colour, the two pedicelled spkts. project further (often for their whole length) from the involucre and all the outer glumes are very strongly ribbed and often scabrid and sometimes even furnished at the back with the characteristic small tubercles. Base of the spike with a ring of white hairs like all the other nodes of the plant. The involucral spikelets are always shorter than in I laxum, being only ·12″ whereas they are always over ·15″ in the latter species.

Fls. *Oct.—Dec.*

Not so common as the last in the western districts, but the commoner species in the eastern districts. Frequent on metamorphic rocks as well as on cotton soil.

An excellent fodder and opinions differ as to the relative merits of these two grasses.

561. Aristida setacea, *Retz.* Jhani, *Vern.* (Chanda).

A slender perennial grass 3—4 ft. high with very slender convolute leaves 9·20′ long and panicles of very narrow spikelets with barbed fruits and 3-fid long awns. Branches of panicle capillary, 4—5 from each node of panicle, secund, scabrid. Spikelets ·3″, branches of awn ·7—1″ scabrid.

Fls. *Oct.—Nov.* Fr. *Nov.—Jan.*

On sandstone and a pest of over-grazed areas on sandy soils.

Several other species of Aristida occur, *e.g.*, **A. redacta,** *Stapf.*, with thin, not secund, panicles and the awn 3-fid high up, instead of at the base. **A. Hystrix** and **A. Cumingiana,** *Trin.* The last is characteristic of sandy soils in Raipur and is one of the plants called 'Barbhusi' (*vide* Eragrostis). It is much more elegant than the other species of Aristida, with reddish panicles and small spkts. also with delicate 3-fid awns.

All of these are useless pests.

562. Phragmites Karka, *Trin.* Nal, *H.*

A very large grass 10—20 ft. with wide spreading stolons and jointed hollow leafy stems.

Leaves distichous about 16″ by 1″ rather rigid, with subulate tip. Panicle 1—2 ft. very compound, usually grey or purplish with innumerable linear spkts. with several glumes, axis of spikelet jointed between the glumes and with long silky hairs.

Fls. *Nov.—Dec.*

Along sandy nalas and rivers but not very common in the Southern circle. Makhari valley, Paraswara range, and other valleys in Balaghat; S. Sihawa (Rai.) common.

563. **Eragrostis tenella,** *Roem.* Chipad, *Gondi*, and its var. plumosa and **Eragrostis interrupta,** *Beauv.*, are the grasses usually known as 'Barbhusi' or Chhota Barbhusi. Slender delicate grasses with several panicles of small often purple spikelets composed of several small ribbed glumes and frequently long ciliæ at the nodes of the panicle

E. interrupta, var. tenuissima has linear-oblong panicles sometimes over 12″ long with interrupted whorls of short branches.

Fls. *Nov.—Dec.*

Gregarious, and characteristic of over-grazed heavily trampled areas, on clay, quartzite and other metamorphic rocks, especially in Raipur. They are thickly covered with drops of dew on cold weather mornings and in the hot weather are dangerous carriers of fire, burning like tinder and often extending over fire-lines where, on account of the dwarf-habit of these grasses, the lines have not been burnt.

E. tenella, var. viscosa, *Stapf.*, a very tufted form is viscid and has a distinct smell which may e detected when walking through the grass. The anicle is dense and often purple.

Other species of Eragrostis occur but have omewhat different habit and are unimportant. . tremula is a very pretty grass 1—2 ft. high ith the linear inclined spikelets often composed f over 20 prs. of glumes.

64. Cynodon dactylon, *Pers.* The Dub rass, only occurs near a few naḷas with sandy am.

ARTIFICIAL KEY TO THE TREES, SHRUBS AND CLIMBERS.

The key is based almost entirely on vegetative characters, such as can be ascertained with the unaided eye or, at most, with the occasional use of an ordinary pocket lens magnifying up to 10 diameters.

In cases of doubt as to which category a plant belongs it will be found in *each* category to which it is capable of belonging. Where the number of secondary nerves is given this signifies the number on one side of the midrib only. The word pairs is omitted. In describing pinnate leaves, the word pairs is here only used where the leaflets are opposite. In cases where the leaflets are not opposite the total number of leaflets is given.

The following abbreviations are used:—

1—2″. one to two inches in length or, in the case of a flower, one to two inches in *diameter.*

Fl.	Flower.
Fr.	Fruit.
L.	Leaves.
ell.	elliptic.
lanc.	lanceolate
m s.	moderate sized.
peti.	petiole.
sec n.	secondary nerves.

PART I.—TREES. To p. 300.

Plants with distinctly woody stems and *branches*, attaining 15 ft. and more in height, excluding Palms and Bamboos (q v.).

I. Leaves simple. Cp. pp. 291, 293, [includes also leaves with only 1 leaflet and deeply lobed leaves in which the lobes are connected at the base]. (See also 176 which sometimes has 1-foliolate leaves.)

A. Leaves opposite or whorled

Cp. p. 277 (sub-opposite only in some Terminalias and Anogeissus; sometimes alternate at the ends of quickly growing shoots; often fascicled in Nos. 300-303 and 305).

§ Margins of the leaves quite entire. Cp. p. 276.

* Leaves penni-nerved. Cp. p. 275 (*i.e.*, with only one strong nerve, the midrib starting from near the top of the petiole. Nerves starting from the midrib are called secondary. If these consist of strong and finer *intermediary* nerves, only the stronger are counted as secondary. Nerves starting from the secondary are termed tertiary.)

† Juice milky (Apocynaceæ, exc. 478). To p. 271.

(1) Large tree. L. whorled with many spreading very fine sec. n. ... 331 Alstonia scholaris.

(2) Small trees. L. bi-farious. Branchlets solid.

(*a*) Milk yellowish. L. 3—5" tomentose ... ... 334 Wrightia tomentosa.

(*b*) Milk white. L. 6—12" glabrous or pubescent.

Leaves more or less oblong, usually narrower below middle. Fls with linear scales. Follicles cohering at their tips ... ... 333 Wrightia tinctoria.

L. more or less ovate, usually broader below the middle. Fls without scales. Follicles divergent ... 332 Holarrhena.

(3) Small tree, branchlets hollow.

L. large hispid ... ... 478 Ficus hispida.

†† Juice not milky. To p. 276.

(1) Large trees (exc 259) with deciduous stipules, youngest pair covering the prominent bud and leaving a marked interpetiolar scar on falling (Rubiaceæ, exc. 259). To p. 272.

(*a*) Terminal buds lanceolate, ·5—·75″ long. L. longer than broad.

L. shining coriaceous. Sec. n. over 14 each side. Fls. in axillary cymes	259 Carallia.
L. not coriaceous. Sec. n. under 14. Branchlets often terminating in a globose head of flowers or a succulent pseudocarp ...	293 Anthocephalus.

(*b*) Terminal buds very broad or oblong, blunt.

Buds sub-orbicular. L. cordate. Fls. in globose heads	291 Adina.
Buds oblong. L broadly elliptic. Fls. in globose heads	292 Mitragyna.
Buds oblong or branchlets terminating in tomentose panicles of small fls. or recurved capsules. L. 4—10″ ell., pubescent ...	294 Hymenodictyon.

(2) Small trees. Stipules interpetiolar, deciduous or not, buds gummy or inconspicuous (Rubiaceæ). To p. 273.

(*a*) Branches spinescent. L. mostly fascicled.

Bushy. Thorns close 4-seriate. L. ·5—3″. Fls. small yellowish. Fr. small ·7″	303 Canthium parviflorum.
Bushy. Thorns sometimes few L. 3—4″ (small at time of fl.). Fls. small green Fr. 1—1·5″ ...	305 Vangueria.
Bushy. Bark brown. L. 2—4″. Fls. m. s. white ·5—1·5″. Fr. m. s. 1—1·25″	302 Randia dumetorum.

Straight or bushy. Bark black. L. 2—8″. Fls. large white 1·5—2″. Fr. large 2—2·5″	301 Randia uliginosa.
Straight. Bark white. L. 1—4″. Fls. m. s. white, usually when leafless. Fr. large 2—3″ hard ...	300 Gardenia turgida.

(*b*) Unarmed (see also 301 which is some times unarmed.) L. not fascicled.

x L. pubescent. Stipules persistent or deciduous.

Small hoary pubescent tree. Stipules recurved. Fls. and frs. small, panicled	295 Wendlandia.
Small dark green tree. Stipules erect deciduous. Fls. m s. in heads, fr. a pseudocarp	308 Morinda (var.).

xx L. glabrous (exc. sometimes in nerve axils). Shining.

L. large 6—10.″ Bark brown. Fls. m. s. white. Fr. a pseudocarp ...	308 Morinda.
L. large 5—10″. Bark white. Fls. very large, white solitary. Fr. 1—15″ ...	299 Gardenia latifolia.
L. 4—6″ elliptic. Petiole ·5″. Fls. small in dense axillary umbellate cymes ...	304 Canthium didymum.
L. 3—6″, oblong. Petiole under ·25″. Fls. small, white, in dense terminal panicles	307 Ixora parviflora.

(3) Small tree. Stipules minute, not interpetiolar, caducous. Branchlets with 4 stipular lines.

L. 1·7—3·25″. Peti. ·1—·15″. Fls. minute	107 Euonymus.

(4) Stipules altogether absent; To p. 276.

(*a*) Glands or scales present in the leaves (visible as translucent dots) or on the leaves (lower surface) or petiole. Glands sometimes obscured by dense tomentum. To p. 274. *Vide* also Anogeissus.

x Glands visible as translucent dots. (1) L. with numerous fine sec. n. glabrous (Myrtaceæ).

Large or m. s. tree with brown and crimson blaze. L. ell. 3—6″ ...	270 Eugenia Jambolana.
Small tree along river-beds. L. 3—5″ lanceolate	271 Eugenia Heyneana.

xx Glands visible as minute black dots on under surface (Melastomaceæ).

Small tree. L. glabrous with obscure nervation 1·5—2·5″. Fls. blue ...	276 Memecylon.

xxx Glands visible as glistening dots on under surface. Fls. small (Verbenaceæ).

Small tree. L 3 5—6″ nearly glabrous. Fls. white	398 Premna barbata.
Tree m. s L. 5·5—10″ villous or pubescent. Fls. white	399 Premna gmelinoides.
Tree m. s. L. 5—8″ densely stellately yellow tomentose. Fls. white ...	400 Premna tomentosa.
Tree m. s. L. 6—12″ densely stellately white tomentose. Fls. pink. Fr. small white	395 Callicarpa.
Tree (Teak) L. 10—18″ and over 6″ broad, covered between nerves when old with hard white tomentum, densely stellate tomentose when young. Fr. dry ...	396 Tectona.

xxxx L. with 1—2 large tubercular glands at base or on top of petiole, oblong or ell., 5—9″.

Bark smooth greenish-white. L. glabrous. Petiole rarely ·3″ ...	261 Terminalia Arjuna.
Bark rough, nearly black. L. rarely glabrous. Peti. ·2—·4″ ...	260 Terminalia tomentosa.
Bark with shallow cracks, brown. L. silky or glabrescent, ovate oblong. Peti. over ·4″ ...	262 Terminalia Chebula.

(*b*) Glands or scales absent. (1) Surface not hidden by tomentum. Cp. p. 273.

x L. smooth and glabrous or but slightly hairy when young.

o L. sessile or sub-sessile (peti. rarely ·15″).

Straight tree. L. 2—5″ ell. to ovate-lanceolate ... ... 277 Lagerstrœmia parviflora.

Low tree with rounded crown. L. 1·5—3″ ovate or orbicular ... 354 Strychnos potatorum.

Small tree, often spinescent. L. ·5—1·25″ rhomboid with cuneate base ... ... 279 Lawsonia alba.

oo L. distinctly petioled.

Straight tree. L. 2—4″ ell. obtuse. Peti. ·25—·75″. Fls. greenish, capitate ... .. 264 Anogeissus latifolia.(1)

Small straight tree. L. 1—2·5″ acute. Peti. slender ·5″. Fls. small purple, panicled ... ... 429 Santalum.

Small tree L. 3·5—8″. Sec. n. about 10. Peti. ·5—1″. Fls. white, ... 326 Linociera.

Small bushy tree. L. 2—6″ Sec. n. 3—4. Peti. ·5—1·5″. Fls. white 397 Premna latifolia.

xx L. silky, pubescent or villous, at least beneath. Not scabrid.

Bark white smooth. L. 2—4″ tomentose or pubescent ... ... 264 Anogeissus latifolia (1) (var.).

Bark dark rough. L. 1·5—2″ silky ... 265 Anogeissus acuminata. (1)

Bushy tree L. 2—6″ somewhat aromatic when crushed, shortly hairy or pubescent ... 397 Premna latifolia.

xxx L. very scabrid.

mall tree with drooping 4-angled rough branchlets ... ... 324 Nyctanthes.

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(1) Microscopic glands, not usually detectable in the field ay be present in 279 and 397 and in Anogeissus.

** Leaves palmi-nerved [*i.e.*, with three or more strong nerves, including the midrib, starting from the top of the petiole or close to base of midrib]. Cp. p. 271.

† L. pubescent, villous or gland-dotted beneath.

L. broadly ovate cordate. Hairs stellate or underside glaucous...	402	Gmelina arborea.
L. elliptic or oblong, villous or pubescent and glandular beneath	399	Premna gmelinoides.
L. ovate, and shoots with fulvous stellate tomentum... ...	400	Premna tomentosa.
Small tree. L. oblong, nearly glabrous, with scattered glands beneath	398	Premna barbata.
Small tree. L. ovate, shortly villous beneath	397	Premna latifolia.

†† L. glabrous (the glaucous form of 402 appears glabrous under a weak lens. No. 398 is also glabrous sometimes when quite mature).

L. shining ovate to sub-orbicular. Peti. ·3—·5″ long ...	353	Strychnos Nux-vomica.
L. elliptic to ovate. Peti. 0—·2″ ...	354	Strychnos potatorum.

§§ Margins of the leaves not entire.

Cp. p. 271. (*See also 260, 261 which are sometimes toothed or denticulate esp. in seedlings and No. 402 which is coarsely toothed as a seedling*)

† Leaves smooth and glabrous.

Small tree with crenate or serrulate leaves 2—6″ and slender sec. n.	110	Elæodendron.

†† Leaves pubescent or hairy or, if nearly glabrous, then glandular.

Small tree. L. 3·5—6″ usually with few coarse teeth	398	Premna barbata.
Tree m. s. L. 5—10″ with aromatic odour, coarsely toothed ...	399	Premna gmelinoides.

††† Leaves scabrous.

Small tree	324	Nyctanthes.

B. Leaves alternate. Cp. p. 271.

[See also 260 and 261 which have sub-opp. and sometimes alt. leaves, and quickly growing shoots of other trees with normally opposite leaves].

§ Margins of leaves quite entire or tip emarginate (exc. Nos 479 and 480. See also 92). To p. 287.

L. penni-nerved [see also some Ficus under * * in which lateral basal nerves are often very weak. Nos. 482, 461, many Euphorbiaceæ and others have often sec. n. close to base.] To p. 284.

† Juice milky (sometimes sub-watery in 464 Streblus). To p. 278.

(1) Branches thick and fleshy with pairs of stipular prickles persisting after fall of leaves.

Branches ridged with interrupted lines of tubercles bearing the prickles (or leaves) ... 432 Euphorbia neriifolia.
Branches terete, the prickles on quite flat cushions .. ... 431 Euphorbia nivulia.

(2) Branches green fleshy fistular unarmed.

L. very small or O. ... ... 430 Euphorbia Tirucalli.

(3) Branches woody (very thick and rather fleshy in 329), unarmed. To p. 278.

(*a*) Stipules large, enclosing the terminal bud, falling on the expansion of the leaf and leaving a very evident annular scar on the branchlets (Moraceæ).

x Fls. and minute fruits contained in closed fleshy receptacles.

Figs. ... ... Ficus (see **)

xx Fls. and fruits on the outside of large fleshy-respectacles.

L. 4—8″. Jack fruit ... 483 Artocarpus integrifolia.

(*b*) Stipules large, deciduous, leaving a small scar each side of the petiole base (Moraceæ).

Leaves 6—10″, tomentose beneath, sec. n. strong, 10—14 each side...	482 Artocarpus Lakoocha.

(*c*) Stipules small, subulate, erect and persistent (Moraceæ).

Small tree with very scabrous leaves 1—3″ long. Juice sometimes sub-watery	464 Streblus.

(*d*) Stipules entirely absent.

Tree with rounded crown and tomentose twigs. L. clustered 5—8″	314 Bassia.
Small or large tree. L. obovate-oblong clustered 2—4″ shining glabrous	315 Mimusops hexandra.
Small cultivated tree. L. elliptic acute glabrous (exc. very young)	316 Mimusops Elengi.
Small scraggy garden tree. L. clustered large lanceolate glabrous 6—15″. Sec. n. strong ...	329 Plumeria.

†† Juice not milky. (See also 464 Streblus.) (Fr. with milky juice in Casearia.) Cp. p. 277.

(1) Leaves with translucent dots. (Secretory cells containing resin and turning brown when dry in the Anonaceæ (¹), permanently translucent in Samydaceæ, crystal cells in Alangium, oil cavities in Rutaceæ.) To p. 280.

(*a*) Branches armed with axillary thorns. Leaves scented (Rutaceæ).

L. over 3″ long. Petioles often winged. Fls. m. s. ...	86 Citrus.
L. under 3″ long, tip emarginate. Fls. small	85 Atalantia.

(¹) The dots are often very minute in Anonaceæ but are quite practicable field characters in most. In Miliusa they are scarcely more translucent than the surrounding cells and Miliusa is therefore also included in the next category. Dots visible from one side in Anogeissus, p. 281.

(*b*) Branches unarmed. L. aromatic when bruised (Lauraceæ, Anonaceæ).

x L. permanently pubescent, at least beneath.

Small tree. L. 4—9″ oblong. Sec. n. 7—12, tertiary n. strong scalariform. Peti. ·25—·75″	423 Litsæa polyantha.
Small tree. L. 3—8″ ell. Sec. n. 8—10, tertiary n. fine. Peti. ·75—2″	422 Litsæa sebifera (var.).
L. 5—10″ broadly ell. or ovate. Sec. n. 10—12, tertiary n. fine irregular. Peti. ·2—·25″	6 Miliusa.
L. 4—7″ lanceolate acuminate. Sec. n. 6—9. Peti. ·2—·25″	4 Polyalthia cerasioides.
L. 2—6″ ovate or oblong. Sec. n. 5—10. *Peti. ·2—·25″*	*7 Saccopetalum.*

xx L. glabrescent (exc. on nerves in 422).

Small tree with tomentose shoots. L. ell. Peti. slender	424 Litsæa sebifera.
Straight tree pyramidal crown. L. 5—8″ narrowly lanceolate undulate. Gardens	5 Polyalthia longifolia.
Small tree. L. oblong or oblong-lanc., obtuse, 2—4″ rarely 6″ (custard apple)	8 Anona squamosa.
Small tree. L. oblong acute 5—8″, cultivated only	9 Anona reticulata.

(*c*) Branches unarmed. Leaves not scented nor aromatic.

x L. permanently pubescent or tomentose.

Small tree. L. oblong 2—7″. Sec. n. 7—10″. Translucent dots mostly elongated	282 Casearia tomentosa.

xx L. glabrous or glabrescent.

Small tree. L elliptic 4—8″ usually crenate. Sec. n. 7—10. Dots often elongated	283 Casearia graveolens.
Small tree. L. glabrous thick shining oblong-oblanceolate 2—5″	458 Gelonium.

(*d*) Branchlets often ending in a thorn.

L. not scented, narrow 3—6″. Gland pits with tufts of hair in the axils of several of the sec. n. beneath ... 290 Alangium.

(2) Leaves with or without *translucent* dots. Dots (secretory cavities) appearing red or yellow, by reflected light, abundant on the leaf margins and floral structures (Myrsinaceæ). Cp. p. 278.

Small tree with young parts rusty pubescent. L. ell. to obovate 2—6″. Peti. ·3—·5″ ... 312 Embelia robusta.

Small tree with rather fleshy glabrous leaves 4—8″. Peti. ·25″ stout ... 313 Ardisia solanacea.

(3) Leaves without translucent or red dots. (Opaque dots due to cystoliths visible on surface of Holoptelea when dry.) To p. 284.

(*a*) Leaves permanently pubescent or tomentose beneath, at least on the nerves. To p. 282.

x L. large, *i.e.*, larger leaves on the shoots over 6″ long. To p. 281.

L. 8—18″ often clustered, felted with grey papillæ between the nerves beneath ... ... 139 Semecarpus.

L. mostly 6—7″, not grey felted between the nerves, oblong, obtuse. Sec. n. over 12 ... ... 136 Buchanania latifolia.

L. mostly 4—8″, ell. to orbicular, sec. n. 6—10. Bark black rogose ... 320 Diospyros melanoxylon.

5—10″ broadly ell. to ovate. ti. ·25″. Bark brown or grey, deeply cracked ... 6 Miliusa velutina.

L. 4—8″ ovate oblong. Peti. over ·4″. Sec. n. 8—12	262 Terminalia Chebula
L. 6—7·5″ ell.-oblong acuminate Branches thorny. Tertiary n. fine branched	319 Diospyros sp.
L. 4—10″ ell.-oblong. Trunk often thorny. L. grey or glaucous beneath with strong scalariform tertiary n. Sec. n. 15—20 each side	434 Bridelia retusa.

xx L. small or m. s., *i.e.*, larger leaves on the shoots under 6″ (rarely 6′ in 318 and 443, very rarely in 446 and 447). Cp. p. 280.

Bark smooth green to red, often thorny. L. 3—6″ thinly pubescent. Peti. ·15—·3″	318 Diospyros montana.
Small tree. Bark brown rough. L. 3—6″ ell.-oblong apiculate. Fl. and fr. axillary	443 Glochidion velutinum.
Small bushy tree. L. 2—4″ rarely 5″ obovate-lanc. or narrow-ell. acute Fls. and small frs. in sub-solitary spikes	447 Antidesma diandrum.
Small bushy tree. L. 2—4″ broadly ell. obtuse Fls. and small frs. in panicled spikes	446 Antidesma Ghæsembilla.
Large tree. Bark smooth. Blaze cream to light brown. L. 2—4″. Fls. before leaves, clustered	461 Holoptelea.
Straight tree. Bark smooth, white. Blaze pale red. L. 2—4″ ell. mostly sub-opposite. Fls. small in peduncled heads	264 Anogeissus latifolia.
Bushy tree, usually thorny. Bark grey, rough. L. 1—3″ ell. to obovate. Sec n. 3—6	317 Diospyros chloroxylon.
Trunk short. Bark very rough. L. 1—3″ rhomboid to obovate rounded. Sec. n. 8—10	14 Capparis grandis.

(*b*) L. glabrous or only somewhat pubescent when young. Cp. p. 280.

x L. large, *i.e.*, larger leaves on the shoots over 6″ (smaller leaves are common at the base of shoots, *vide* also 361 Ehretia).

Leaves clustered 6—12″ oblong-lanceolate, coriaceous (Mango) ...	134 Mangifera.
L. clustered 4—8″ broadly or obovately elliptic. Fl. small, spicate	263 Terminalia belerica.
L. often clustered 6—15″ obovate, some crenate. Fls. large. Fr. a large berry	273 Careya arborea.
L. often clustered 3—6″, rarely 9″, obovate to oblanceolate, some denticulate. Fls. in long drooping racemes. Fr. angled ...	272 Barringtonia.
L. 5—9″ distichous oblong shining. Bark smooth grey ...	320 Diospyros embryopteris.
L. 4—9″ ell. oblong, grey or glaucous beneath with raised scalariform tertiary nerves. Trunk in young trees often thorny. Blaze crimson	434 Bridelia retusa.
L. 4—8″ obovate with rounded apex, hard. Cult. (Cashew Nut) ...	135 Anacardium
L. 4—8″ broad-ovate shining coriaceous. Fl. panicled (Sal) ...	21 Shorea.
L. 4—7″ ovate to oblong-lanceolate shining, base rounded, often oblique, gradually tapering. Fls. axillary small clustered. Fr. globose	442 Glochidion zeylanicum.
L. 3—6″ ell.-oblong or lanc., base mostly acute, apex usually cuspidate Bark smooth. Blaze pale pink. Fr. depressed, furrowed ...	441 Glochidion lanceolarium.

xx L. small, *i.e.*, larger leaves rarely attaining 6″ long (see also 441 and 442, also 93 Ochna which sometimes has entire leaves).

Small tree. Bark white. L. 4—5 rarely 7″. Sec. n. 5—6 with small tufts of hair in their axils	362 Ehretia lævis.
Trunk short. Bark dark rough. L. 3—5″, often clustered, obovate to lanceolate	272 Barringtonia.
Trunk sometimes with large thorns. Bark greenish to red, smooth, flakey. L. 2—5″	318 Diospyros montana.
Bark rough. L. 2—5″ lanceolate or narrow-oblong, acuminate, glaucous beneath	485 Salix.
Small bushy tree. L. 2—4, rarely 5″ obovate-lanceolate or narrow-ell.	447 Antidesma diandrum.
Straight. Bark rough, deep brown. L. 2—4, rarely 5″, scattered, stiff, ell. to linear-oblong obtuse pale beneath. Peti. ·5—·6″.	137 Buchanania angustifolia.
Straight. Bark white. L. 2—4″ broadly elliptic obtuse	264 Anogeissus latifolia.
Bushy. Bark rather rough brown. Blaze pink. L. 2—4″ lanceolate to orbicular, somewhat glaucous beneath Sec. n. 6—7 very oblique Fr. 25″	435 Bridelia Hamiltoniana.
Bark black rough. L. 2—4″ broad elliptic or orbicular. Sec. n. 7—10 spreading	436 Cleistanthus.
Bark smooth, grey. Blaze cream or brown. L. 2—4″	461 Holoptelea.
L. distichous, broadly lanceolate, 2—3·5″, edges often wavy rarely serrate	445 Putranjiva.
Branchlets clustered. L. 1—3″ arranged like the leaflets of a pinnate leaf. Cult	438 Phyllanthus distichus.
L. ·3—·75″ arranged like the leaflets of a pinnate leaf	437 Phyllanthus emblica.

** Leaves palmi-nerved. [See also 461 and others under * in which some of the sec. n. rise close to base, in *Ficus* lateral basal nerves sometimes very weak but, exc. F. tjakela, differ in direction from the other sec. n.] Cp. p. 277.

† Juice milky. Twigs with annular scars. To p. 285.

(1) Leaves with very inequilateral base.

L. 6—15″ oblong-lanceolate, usually serrate, larger basal lobe 3—4-nerved, small tree with figs on leafless branches ... ... 479 Ficus Cunia.
L. 3—8″ sub-rhomboid, scabrous, base 3-nerved. Sec. n. 4—5 . 465 Ficus gibbosa

(2) Leaves with sub-equal or equilateral base.

(*a*) L. more or less pubescent or tomentose beneath. Base more than 3-nerved. Often epiphytes or with aerial roots under favourable conditions.

L. 4—8″ ovate to ell. with rounded or sub-cordate base, shoots and leaves beneath green, more or less hairy or pubescent on nerves ... 466 Ficus bengalensis.
L. 2—8″ ell. ovate or obovate with cordate base, shoots and leaves beneath tomentose, a glandular slit on midrib beneath in most leaves ... ... 467 Ficus tomentosa.

(*b*) L. scabrid or tomentose beneath, often lobed and toothed. Base 3—5-nerved.

Small cultivated tree, never epiphytic or with aerial roots ... 480 Ficus palmata.

(*c*) L. often pubescent when young, finally glabrous, base 3-nerved, underside with minute green dots.

Figs in clusters from the trunk and larger branches ... ... 481 Ficus glomerata.

(*d*) Young parts densely pubescent. L. not quite glabrescent beneath, base 3—5-nerved, basal nerves spreading nearly parallel to the sec. n.

Figs small clustered on small tubercles above the leaf scars ... 475 Ficus tjakela.

(*e*) Shoots and leaves glabrous (rarely somewhat pubescent when young). Figs in pairs (1—2) in the axils of leaves or fallen leaves. Basal pair of nerves more oblique than sec. n. and often with subsidiary basal nerves below them. Often epiphytic when young.

L. 1·5—3″ ell. to obovate with cuneate base. Sec. n very slender 5—12 with intermediate nearly as strong. Petiole 25—·5″ ... 468 Ficus retusa.

L. 3·5—4″ ovate, base rounded, apex shortly suddenly acuminate ... ... 471 Ficus Arnottiana, var. courtallensis.

L. 3—5″ ovate coriaceous with oblique or rounded base; not acuminate; with translucent dots (punctulate) when green, becoming minute tubercles when dry ... 473 Ficus Tsiela.

L. 3—6″ oblong to ovate with rounded base; scarcely coriaceous, shortly acuminate, nor punctulate, nor tuberculate ... ... 474 Ficus infectoria.

L. 5—6″ ovate, gradually tapering to acuminate tip, punctulate ... 472 Ficus Rumphii.

L. 4—7″ broadly ovate with cordate base, shortly suddenly acuminate 470 Ficus Arnottiana.

L. 4—7″ ovate or orbicular with sudden fine acumen one-third to half as long as the entire leaf ... 469 Ficus religiosa.

†† Juice not milky. Twigs without annular stipular scars. Cp. p. 284.

(1) Leaves tomentose beneath.

Small tree with leaves 1—3″ long usually serrulate and armed with stipular prickles	112 Zizyphus Jujuba.
Samll tree with large broadly ovate leaves 4—10.″ Petiole stout 1·5—3″	360 Cordia Macleodii.
Small tree with oblong ovate or obovate leaves 2—5′. Petiole 75—1 5″	359 Cordia Wallichii.

(2) Leaves pubescent or glabrescent beneath.

L. 2—5·5″ oblong, orbicular or obovate. Sec n. about 4 usually pubescent in the axils. Petiole rather slender ·75—1·2″ ...	357 Cordia Myxa.
L. attaining 8 by 5·5″ ovate with cordate or sub-cordate base ..	358 Cordia latifolia.
Branchlets often ending in thorns L. narrow 3—6″, 3-nerved, gland pits or tufts of hair in nerve axils beneath and usually minutely pellucid punctate	290 Alangium.
L. as broad as or broader than long 4—7″ with 7—11-nerved base glabrous	230 Bauhinia retusa.

(3) L. glandular pubescent or hoary and with small red glands beneath, ovate or rhomboid 3—6″ ... 454 Mallotus.

§§ Lateral margins of leaves quite entire but apex deeply 2-lobed (see also 85 Atalantia). Palmi-nerved. Cp. pp. 277, 287, 290.

Small. L. 2—3″ lobed less than half-way, loosely pubescent beneath...	225 Bauhinia tomentosa.
Bark rough grey. L. 1—2″ broader than long, tomentose to pubescent beneath, basal n. 7—9. Fls. small in simple racemes ...	226 Bauhinia racemosa.
As in 226 but L. 2—4″ puberulous beneath when old, not acid ...	226 B. racemosa (var.).

Bark brown-grey nearly smooth. L. 1—4″ glabrescent or puberulous beneath, acid, basal nerves 9—11. Fls sub-regular white in corymbose racemes	227 Bauhinia malabarica.
L 2·5—6″ grey glaucous and puberulous beneath, lobes rounded, basal nerves, 13—15 rarely only 11. Fls. large irregular, buds cylindrical	228 Bauhinia variegata.
L. 2·5—7″ green glabrous or puberulous beneath, lobes angular at tip, basal n 9—11 Fls. large irregular, buds sharply angled ...	229 Bauhinia purpurea.

§§§ Margins of leaves not entire, *i.e.*, more or less crenate, toothed or with excurrent nerves.

(See also Nos. 479 and 480. For deeply lobed leaves see §§§§, Cp. pp. 277, 286, 290.)

Leaves penni-nerved. To p. 289.

† Juice somewhat milky.

Small tree with scabrid leaves 1—3″	464 Streblus.

†† Juice not at all milky.

(1) Leaves more or less gland-dotted or pellucid punctate. To p. 288.

(*a*) Leaves lemon-scented when bruised. Branches with axillary thorns. Cultivated small trees.

Young shoots purple. Petals tinged with red. Fruit ovoid or oblong (Lemon)	86 Citrus medica
Young shoots pale. Petals pure white. Fruit round or oblate (Orange)	87 Citrus Aurantium.
Young shoots and L. pubescent beneath. Fruit very large (Pumelo)	88 Citrus decumana.

(*b*) Leaves not lemon-scented. Branches unarmed. Small jungle trees.

Twigs and leaves beneath pubescent or tomentose. L. 3—7″ oblong, crenate ... ... 282 Casearia tomentosa.

Twigs and leaves glabrous. L. 4—8″ ell., ell.-oblong or ovate, crenate ... ... 283 Casearia graveolens.

(2) Leaves not gland-dotted nor pellucid punctate.

(*a*) Leaves very large, *i.e.*, exceeding 12″. Sec. n. very strong, numerous, parallel

Small crooked tree. L. obovate to elliptic 12—20″. Petiole distinct 1—3″ ... ... 2 Dillenia aurea.

Mod. sized tree. ell. 12—36″ decurrent below on a short amplexicaul base ... . 3 Dillenia pentagyna.

(*b*) Leaves large, *i.e.*, the larger exceeding 6″ (see also No. 92 below).

Small tree with stringy bark, red blaze. L. 6—15″ obovate crenate-denticulate ... ... 273 Careya arborea.

Small tree with dark rough bark and soft pink blaze. L. rarely over 6″ ... ... 272 Barringtonia.

(*c*) Leaves small, very rarely attaining 6″ (see also 272).

Small. L. 3—5, rarely 6—7″, ell to ell.-oblanceolate finely spinulose-serrate when young, old serrulate, green, glabrous ... ... 93 Ochna squarrosa.

Small L. 3—5, very rarely 6″, broadly ell. or obovate sub-sessile, shallowly crenate, rarely entire, pale glaucous. Sec. n. fine numerous 92 Ochna Gamblei.

Small, often thorny. L. 2—3″ crenate-serrate, glabrous or somewhat pubescent beneath. Sec. n. 3—5, often one pair near base, oblique ... ... 18 Flacourtia Ramontchi.

Large. L. 2—4″ broadly oblong or ovate, rarely coarsely toothed except in seedlings. Sec. n. sometimes close to base ... ... 461 Holoptelea.

** Leaves palmi-nerved (see also 18 and 461 above). Cp. p. 287.

† L. with only 3 strong basal nerves small subsidiary sometimes present. To p. 290.

(1) Branches with stipular thorns. Leaves serrulate. Small trees.

L. 1·5—3″ densely grey or brown tomentose beneath, cymes sessile... 112 Zizyphus Jujuba.

L. 1·5—3″ more or less pubescent beneath. Cymes shortly stalked... 115 Zizyphus Xylopyra.

(2) Unarmed (some branches of 115 also unarmed), extipulate.

Small tree. L. 2—5·5″ repand-dentate, base cuneate to rounded ... 357 Cordia Myxa.

Small or m. s. tree. L. as in 357 but densely stellately tomentose beneath ... ... 359 Cordia Wallichii.

Small tree. L. attaining 8″, base rounded or sub-cordate, tertiary n. strong ... ... 358 Cordia latifolia.

(3) Unarmed. Young leaves stipulate. Small trees.

L. 3—6″ ovate-lanceolate, acuminate silky or silvery beneath ... 462 Trema orientalis.

L. 2—3″ ovate-lanceolate, scarcely acuminate, very scabrous both sides ... ... 463 Trema politoria.

Branched low down. L. 1·5—3″ rhomboid, ell. or obovate, very scabrous both sides . ..	464 Streblus asper.
L. 3—6″ narrow-elliptic or lanceolate acuminate glabrous or with scattered stellate hairs ...	63 Grewia disperma.

†† L. mostly broad with more than 3 strong basal nerves, strong sec. and tertiary nerves. Cp. p. 289.

L. broadly-ovate to ovate-oblong green glabrescent with inequilateral cordate base. Bark smooth. Petiole rather slender ·3—1″. Stipules falcate	64 Grewia tiliæfolia.
L. ovate, oblong or ell. with oblique, not cordate, base. Underside often persistently tomentose. Petioles under ·5″ stout Stipules linear	66 Grewia celtidifolia.
L. broadly-ovate, ell. or orbicular, oblique or subequal at base, grey-green tomentose beneath. Bark black rough with deep crimson blaze	68 Grewia rotundifolia.
L. broadly-ovate, base cordate, tomentose beneath. Peti. 1—4″.	56 Eriolæna.
L. broadly-obovate, base somewhat cordate, tomentose beneath. Peti. ·25—·3″. Fls. red irregular axillary. Fr. spiral	54 Helicteres.

§§§§ Leaves strongly angled or lobed. Base more or less cordate. Cp. p. 277, 286, 287.

* Leaves penni-nerved.

Young plants of Artocarpus, Holoptelea.

** Leaves palmi-nerved (see also 64 which is sometimes somewhat lobed). Base cordate.

† Margins crenate, serrate or toothed.

Small tree. Petiole 1—4″. Fls. yellow 1·5—2″ on long peduncles	56 Eriolæna.
Small tree. Petiole ·25—·3″. Fls. brick-red, irregular .. .	54 Helicteres.
M. s. or large. Petiole 3—8″. L. roundish 6—12″. Fls. large white	55 Pterospermum.
M. s. or large. L. roundish 8—18″ deeply 5—7-lobed, each large lobe mostly 3-partite or with 3 large teeth, not otherwise serrate ...	52 Sterculia villosa.

†† Margins or lobes entire (or sinuate in 49 Kydia. See also 52).

Large tree, bark smooth, greenish to grey with papery exfoliation. L. 8—18″ diam., tomentose beneath	51 Sterculia urens.
Large tree, bark grey not papery. L. 6—12″ diam., stellate, glabrescent	53 Sterculia colorata.
L. roundish 4—6″, sometimes scarcely lobed tomentose beneath with a gland on one to three of the nerves	49 Kydia.
Small straight, soft-wooded, with pale fluted bark. L. 3—8″, young tomentose	17 Cochlospermum
Small crooked soft-wooded. L. (rarely some not lobed) 4—6″, glabrous. Cult	450 Jatropha Curcas.

II. Leaves composed of two leaflets. Cp. pp. 271, 292 & 293.

Large graceful tree with blue-green foliage. L. like those of a Bauhinia but split quite to the base into two lflts. 1—3″ long ...	232 Hardwickia.
Small very thorny tree with grey-green foliage. Lflts. ell. or lanceolate	81 Balanites.

III. Leaves composed of three leaflets. Cp. pp. 271, 291 and 293.

A. Leaves opposite, usually aromatic when bruised, digitate.

Small or m. s. Lflts. 3—5 lanceolate, 2—5″, glabrous except along midrib beneath. Fls. in divaricate loose cymes ... ... 405 Vitex leucoxylon.

Small. Lflts. 3 only, 3—7″ glabrous. Peti. often winged. Fls. in narrow oblong cymose panicles ... 406 Vitex peduncularis.

Small. Lflts 3, rarely 5, pubescent beneath, panicles broad .. 407 Vitex altissima.

B. Leaves alternate.

§ L. digitately 3-foliolate, *i.e.*, leaflets or their petiolules all arising from the end of common petiole (cp. §§).

L. pellucid glandular with straight axillary thorns ... ... 90 Aegle.

L. not glandular. Small unarmed tree with showy flowers ... 13 Cratæva.

§§ L. pinnately 3-foliolate, *i.e.*, with a distinct axis or 'rachis' above the petiole on which the first pair of leaflets is laterally inserted and the third is terminal Lflts. with very short petiolules and often stipellate

* Branches with numerous prickles.

Bark thick corky. Lflts. large, tomentose beneath, often repand... 173 Erythrina suberosa.

Bark thin. Lflts. large glabrescent... 172 Erythrina indica.

** Branches without prickles.

Bark nearly black, blaze streaked crimson, exuding red juice. Lflts. glabrous or downy beneath, end one orbicular to obovate 3—6″ ... 164 Ougeinia.

Bark nearly black, blaze crimson exuding red juice. Branchlets knotted, end lflt. orbicular with rhomboid base 6—8" silky beneath, rarely only the end leaflet present ... ... 176 Butea frondosa,

IV. Leaves composed of 4 leaflets (see also 132).

Pretty tree with spinose stipules. L. with a pair of pinnæ, each pinna with a pair of leaflets 1—2" long 257 Pithecolobium.

Large unarmed tree. Lflts. 3—10" long, basal pair smaller ... 130 Schleichera.

V. Leaves composed of 5 to many leaflets. Cp. pp. 271, 291 and 293.

A. Leaves opposite (upper leaves often crowded and alternate in Stereospermum).

§ L. digitate, *i.e.*, leaflets, or their petiolules, all arising direct from the top of the petiole, without interposition of a rachis.

Lflts. 3—5 lanceolate 2—5" ... 405 Vitex leucoxylon.

Lflts. 3, rarely 5, pubescent beneath 407 Vitex altissima.

§§ L. simply pinnate, *i.e.*, with a distinct axis or 'rachis' above the petiole, along which the leaflets or their petiolules are laterally inserted, often with a terminal end lflt. in addition. Rachis not branched (Bignoniaceæ exc. 325). Cp. §§§.

Small tree. Rachis 2—5". Lflts. 5—7 roundish to obovate, pubescent, ·5—2·5" ... ... 374 Dolichandrone,

L. 9—12", Lflts. 5—7 oblong to ovate-lanceolate subacuminate glabrescent 3—5" ... ... 325 Schrebera,

L. clustered. Lflts 7—11 ell. caudate glabrous 3—5″	376	Stereospermum chelonoides.
As above but acute or acuminate, slightly pubescent beneath 2—7·5″. Petiolule slender ·3—·5″	376	S. chelonoides (var.).
L. clustered. Lflts. 5—11 broadly ell. or oblong, suddenly acuminate, 3—7′ pubescent. Petiolule stout ·05—·25″. Inflorescence viscous	377	Stereospermum suaveolens.
Large tree. L. clustered. Lflts 5—9 ell. or oblong, obtuse or suddenly acuminate 2·5—8″ glabrescent, mostly crenate-serrate. Petiolule 0—2′	375	Heterophragma.

§§§ L. twice pinnate, *i.e.*, primary rachis with one or more pairs of branches, secondary rachides, interposed between the rachis and the leaflets or thrice pinnate, *i.e.*, the secondary rachides again branched. (The secondary rachis with its leaflets is termed a pinna) (Bignoniceæ).

Small tree. Only 1—2 short pinnæ at base of main rachis, rest simply pinnate	374	Dolichandrone.
L. 1—3 ft., 2—3 pinnate. Lflts. ell. to ovate 2—6″ pale or silvery beneath; entire or serrate. Large forest tree. Pod woody	378	Stereospermum xylocarpum.
L. 1—3 ft, 2—3 pinnate; Lflts. ovate-lanceolate acuminate 2—3″, sinuate or crenate. Tall avenue tree. Pod slender	372	Millingtonia.

Small soft-wooded tree with 2—3-pinnate leaves 2—6 ft. Lflts., ovate 4—5″, ternate on the ultimate pinnæ. Pod flattened ... 373 Oroxylum.

B. Leaves alternate (see remark under A. p. 293).

§ Leaves digitate. *Vide* p. 293.

Branches spreading. Bark pale often with conical prickles. Lflts. 5—7, 6—12″ ... ... 50 Bombax.

§§ Leaves simply pinnate (see explanation under A, §§ p. 293. See also 437, 438 and 212.) Cp. pp. 294 and 298.

* Leaves paripinnate, *i.e.*, rachis not ending in an odd leaflet.

† Leaflets pellucid-punctate with glands.

Lflts. 10—20 each side of rachis, unequal-sided, about 1″ long ... 103 Chloroxylon.

†† Lflts. not pellucid-punctate but with small gland scales on under-surface.

L. 9—18″. Lflts. 3—6 prs., 2—4″ long, mostly obtuse ... ... 101 Soymida.

††† L. without pellucid glands or scales (glandular hairy in 91).

Lflts. 2—3 prs., terminal pair longest 3—7″. Inflorescence terminal ... ... 132 Sapindus.

Large tree. Lflts. 2—4 prs., terminal pair longest 6—10″. Inflorescence axillary ... 130 Schleichera.

Small cultivated tree. Lflts. 3—6 prs., lanceolate 3—9″. Fls. corymbose scarlet ... ... 223 Saraca.

Lflts. 4—8 prs., ovate acute or acuminate 2—5″. Fls. yellow racemed ... ... 213 Cassia Fistula.

Lflts. 6—10 prs., ell.-oblong, rounded or mucronate 1·5—2·5″. Fls. yellow panicled ... 214 Cassia siamea.

L. 1—2 ft. Lflts. 6—16 prs., sometimes alternate, lanceolate, acuminate, 3—6″ ... ... 102 Cedrela.

L. 3—6″. Lflts. 10—20 prs., linear-oblong ·3—·6″ ... ... 224 Tamarindus.

Small tree. L. 6—18″. Lflts. 10—30 prs., linear-oblong 1—1·5″. Cultivated ... ... 157 Sesbania grandiflora.

** Leaves imparipinnate, *i.e.*, rachis ending in a single terminal leaflet.

† Leaflets pellucid punctate with glands (Rutaceæ).

Thorny. L. rachis not, or very narrowly, winged. Lflts. 5—7 obovate obtuse entire, or tip crenulate ... ... 89 Feronia.

Thorny. L. rachis with large semi-obovate wings. Lflts. 5—9 crenate 1—3″ ... ... 84 Limonia.

Unarmed. L. rachis not winged. Lflts. 5—9 entire shining ·75—3″ 82 Murraya exotica.

Lflts. 10—25 entire or crenulate, usually acuminate and pubescent, 1—3″ ... . 83 Murraya Koenigii.

†† Leaflets not pellucid punctate.

(1) Margins of leaflets entire (toothed sometimes in seedings) To p. 297.

(*a*) Lflts. (below the terminal) in pairs, opposite or sub-opposite.

L. 1—2 ft. Lflts. opp. to alt. rarely imparipinnate ... ... 102 Cedrela.

L. 6—12″. Lflts. 3—4 prs., 3—5″ pubescent glabrescent oblong suddenly acuminate. Sec. n. 5—12. Petiolule slender ·3—·5″. 97 Bursera.

Lflts. 3—4 prs., 2·5—5″, stellate-pubescent or glabrescent, more or less ovate. Petiolules stout under ·25″ ... ... 138 Odina.

Lflts. 2—3 prs., 2—5″ ovate, shortly bluntly acuminate, glabrous shining, petiolule slender ·25″. Sec. n. about 5 ... ... 203 Pongamia.

Lflts. 3—5 prs., with smell of mangoes, 3—6″, ell.-oblong acuminate. Sec. n. 10—12 ... ... 140 Spondias.

(*b*) Lflts. all alternate (see also 102) (Dalbergia).

Lflts. 3—5, rhomboid or roundish, cuspidate 1—3″ ... ... 197 D. Sissoo.

Lflts. 5—7, orbicular, obtuse or emarginate 1—4″ ... ... 198 D. latifolia.

Lflts. 9—15, ell. to obovate or oblong, ·75—2·25″. Wood normal ... ... 200 D. lanceolaria.

Lflts. 9—15, round to oblong, ·5—1·5″. Wood with alternating bands of xylem and phlœm ... 199 D. paniculata.

(2) Margins of leaflets crenate, serrate or toothed. Lflts. opposite, rarely sub-opp. (or in 98 alternate and sometimes lacking the terminal leaflet). Cp. p. 296.

Small tree with long weak branches. Lflts. 3—5 prs., ·75″ (at base of shoot)—3·5″ variously toothed or sub-lobed ... ... 100 Cipadessa.

Lflts. 3—4 prs., 3—5″ serrate, oblong, suddenly acuminate ... 97 Bursera.

Lflts. 4—8 prs., 1—3″, obliquely falcate-lanceolate, coarsely serrate glabrous ... ... 98 Azadirachta.

Lflts. 6—12 prs., ovate-lanceolate, crenate, pubescent ... ... 96 Garuga.

Lflts. 9—16 prs., lanceolate, coarsely crenate-serrate, more or less pubescent above and glaucous beneath, sessile or sub-sessile ... 95 Boswellia.

Lflts. 10—16 prs., with rachis often terminating in undeveloped lflts., deeply serrate, or sub-lobed, hoary tomentose and glandular with strong smell ... ... 91 Ailanthus.

§§§ Leaves twice pinnate (Leguminosæ exc. Cp. pp. 295, 300).

Main rachis much reduced and mostly ending in a thorn at the base of which the secondary rachides are clustered and resemble simply pinnate leaves.

Small thorny tree. Pinnæ with flattened green rachis 4—9″. Lflts. small or 0 ... ... 212 Parkinsonia.

** Main rachis short bearing only 1 pair of pinnæ.

Tree with straight stipulary thorns. Lflts. only 2, 1—2″ long ... 257 Pithecolobium.

Unarmed. Lflts. 2—3 prs. or up to 7 prs., 2—8″ long ... ... 233 Xylia.

*** Main rachis bearing several pairs of pinnæ (Mimoseæ, exc. 209, 210 & 211).

(1) Branchlets armed with axillary or terminal straight thorns. Lflts. very small.

Small tree. L. 1—3″ long. Lflts. ·05—1″ long. Fls. in tassel-like spikes ... ... 235 Dichrostachys.

(2) Branchlets armed with paired (stipular) prickles. Lflts. small linear under ·5″ (exc. 246). Acacia.

Small tree. Prickles short straight. Rachis 1·5—2″, pinnæ 1—1·5″	240 A. Farnesiana.
Small. Prickles stout long white 1—2″. Pinnæ 2—5 prs. Lflts. 6—9 (rarely 10—12) prs. ...	242 A. eburnea
Bark black deeply cracked. Prickles slender long white ·5—2″. Pinnæ 3—6 prs. Lflts. 10—20 prs. Fl. heads yellow	241 A. arabica.
Bark white (dark below on old trunks). Prickles ·25—1″. Pinnæ 5—10 prs. Lflts. 12—30 prs. Fl. heads white, panicled ...	243 A. leucophlœa.
Bark grey. Prickles short slightly curved. Pinnnæ 3—5 prs. Lflts. 10—20 prs. ·25—·35″ long, glaucous beneath	245 A. ferruginea.
Bark black. Prickles short hooked. Pinnæ 7—22 prs. Lflts. mostly 12—20 prs. ·1—·2″ long, not glaucous	244 A. Catechu.
Bark brown. Prickles curved. Pinnæ 2—4 prs. Lflts. ·75—1·5″.	246 A. lenticularis.

(3) Lflts. resembling those of Sect. (2) but prickles not stipular, numerous, small or obsolete on some branches, sometimes minute on the leaf rachis.

Small tree with pale bark and pale pink blaze. Pinnæ 10—27 prs. Lflts. 25—40 prs.	247 Acacia Donaldi.

(4) Prickles or thorns absent. Lflts. mostly over ·5″ (exc. 256 and 254).

(*a*) Forest trees (exc. 251). Albizzia.

Small tree with yellow tomentose shoots. Pinnæ 6—15 prs. Lflts. numerous ·25″	256 A. amara.
Large tree. Bark grey. Shoots tomentose. Pinnæ 5—10 prs. Lflts. 20 prs., larger ·5—·6″ ...	254 A. Thomsoni.
Bark brown or grey. Pinnæ 2—5 prs. Lflts. 6—24 prs., oblong or falcate ·6—1·2″, two to three times	

longer than broad. Fl. heads panicled	252 A. odoratissima.
As above. Lflts. 6—11 prs. 1—1·9". Fl. heads panicled. Peduncles under 1·25". Fls. sessile. Pods purplish-green to red-brown ...	253 Var. lebbekifolia.
Bark grey cinereous. Pinnæ 2—4 prs. Lflts. 6—8 rarely up to 13 prs., oblong, 1—1·5", rarely twice longer than broad. Fl. heads on long axillary peduncles 2—4" long. Pods straw-yellow ...	251 A. Lebbek.
Bark greenish-white. Lflts. 1—2·3" broader at base on the upper side of the principal nerve ...	255 A. procera.

(*b*) Planted roadside, village or garden trees.

Large tree with many main branches. Lflts. 1—2" rhomboid with diagonal main nerve ...	258 Enterolobium.
Handsome dark-foliaged tree with brown tomentose shoots. Pinnæ 8—10 prs. Lflts. 10—15 prs., narrow oblong ·5—·75". Fls. yellow, not in heads ...	209 Peltophorum.
Tall light-foliaged tree. Pinnæ 20—30 prs. Lflts. over 60 prs. ...	236 Parkia.
Small tree. Pinnæ 4—8 prs. Lflts. 10—15 prs. linear glaucous ·4—·5".	237 Leucæna.
Spreading tree. Pinnæ 8—20 prs. Stipules large pinnate. Fls. gaudy orange and red (Gold Mohur) ...	211 Poinciana regia.
Pinnæ 3—8 prs. Lflts. 10—20 prs. ·3" obtuse. Stipules linear caducous. Fls. large yellow ...	210 Poinciana elata.

§§§§ Leaves twice to thrice pinnate. Lflts. more or less ovate. Cultivated trees.

Pinnæ 3—4 prs. Lflts. ·5—·3" ovate-lanceolate acuminate, mostly serrate	99 Melia.
Pinnæ 4—6 prs. Lflts. ·5—·75" ovate or obovate, entire, on slender petiolules	141 Moringa.

PART II.—SHRUBS. (To p. 315.)

Plants with distinctly woody stems and main branches, not usually exceeding 15 ft., often with several stems or large branches from near the root, or branched low down, excluding Palms (q. v.).

a. Not parasitic on the branches of other trees or shrubs. Cp. p. 315.

I. Leaves simple. Cp. 311, 312.

A. Leaves opposite or whorled (often fascicled in Rubiaceæ). To p. 306.

§ Margins of leaves quite entire (see also No. 410). To p. 304.

Leaves penni-nerved. To p. 304.

† Juice milky. To p. 302.

(1) Armed with simple or 3-fid. spines.

Erect. L. ·5—1·5″ mostly acute and apiculate. Fls. small white star-shaped	327 Carissa spinarum.
Erect or straggling, cultivated. L. 1·5—3″ *shining, tip rounded or* obtuse	328 Carissa Carandas.

(2) Unarmed.

Large shrub or small tree. L. 4—12″ Peti. 0—·25″ ...	332 Holarrhena.
Large garden shrub. L. 2—6″ glossy, sec. n. 6—8. Peti. ·25—·5″; Fls. white ...	335 Tabernæmontana.
Large shrub. L. 3—6 in a whorl, 4—8″ lanceolate acuminate. Sec. n. over 30	330 Alstonia venenata.
Large garden shrub. L. 2—3 in a whorl, 4—8″ linear lanceolate. Sec. n. over 30	337 Nerium.
Shrub 5—12 ft. with large whitish	

leaves woolly beneath. Fls. with spreading corolla ... 342 Calotropis gigantea.

Shrub 3—6 ft. L. similar to 342 but less woolly. Fls. with erect corolla lobes ... ... 343 Calotropis procera

†† Juice not milky. To p. 304.

(1) Armed with thorns or prickles. L. often in fascicles.

Bark black. L. obovate to oblong obtuse 2—8″. Fls large white 1·5—2″ ... ... 301 Randia uliginosa.

Bark brown. L. obovate obtuse or acute 1—4″. Fls. m. s. white ... 302 Randia dumetorum.

L. glabrous or pubescent ovate or oblong acute or acuminate 3—4″ Fls. very small greenish 5-merous Fr. large 1—1·5″ diam. globose ... ... 305 Vangueria.

Spines close and decussate often exceeding the ·5—2·5″ long glabrous obtuse leaves Fls. very small 4-merous ... 303 Canthium parviflorum.

Cult. or semi-wild. L. lanceolate or narrow rhomboid ·7—1·5″. Fls. small cream... ... 279 Lawsonia.

Cult. (Pomegranate) L. about 2″ obtuse. Fls. m. s. scarlet ... 280 Punica.

(2) Unarmed (see also 301, 279 and 280 above which are sometimes nearly thornless).

(*a*) L. pellucid dotted with interior oil glands ... 271 Eugenia Heyneana

(*b*) L. with minute black dots on lower surface ... 276 Memecylon.

(*c*) L. with minute glistening yellow glands on lower surface.

Tall shrub with bark peeling off in vertical strips Fls. blue. L. ell. acuminate ... ... 411 Caryopteris.

Large sarmentose shrub. Fls. white. L. deltoid or ovate, often glabrous ... ... 408 Clerodendron phlomoides.

(*d*) L. with small peltate scales on lower surface.

Sarmentose shrub with rusty shoots, ovate or ell. acuminate leaves 2·5—5″. ... ... 269 Calycopteris.

Erect bushy shrub with sub-sessile lanceolate leaves 2·5—4″ and scarlet fls. ... ... 281 Woodfordia.

(*e*) Leaves without glands or scales (exc. sometimes in the nerve axils). To p. 304.

x Leaves with interpetiolar stipules.

Bushy, with gummy buds, ell. oblong leaves 4—8″ acute both ends. Sec. n. 20—25 ... 297 Gardenia lucida.

Stem usually single, white. Buds gummy. L. oblong to obovate 1·5—3″ with usually sub-cordate sub-sessile base. Sec. n. 12—16 ... ... 298 Gardenia gummifera.

Usually a small tree with pale bark. Buds gummy. L. broadly ell. to orbicular sub-sessile 5—10″. Sec. n. 12 ... ... 299 Gardenia latifolia.

Shrub 4—6 ft. L. glossy oblanceolate-oblong 3—7″. Petiole ·3—·5″. Fls. ·4—·6″ white in terminal corymbs ... ... 296 Webera.

Shrub or small tree with compressed twigs, 2-ranked ovate or lanc.-ovate acuminate leaves 3·5—6″. Sec. n. 4—6 usually with gland pits in their axils. Fls. axillary ... ... 304 Canthium didymum

L. coriaceous glabrous 3—6″ with rounded or cordate base and obtuse tip. Fls panicled ... 307 Ixora.

L. ell. or obovate pubescent 3—8″. Sec. n. 11—15. Peti. ·5—1″. Fls. panicled, white ... 306 Pavetta.

Fœtid when bruised. L. stiff 4—9″. Sec. n. 15—20 strong. Peti. ·25—·75″. Fls. lilac or white... 309 Hamiltonia.

x Leaves without stipules.

o Indigenous jungle shrubs.

Large, sarmentose. L. ell. to oblong shining coriaceous 4—7″. Fls. irregular ... ... 79 Hiptage.

Large, sarmentose. L ovate to ovate-lanceolate, pubescent till old, 2—5″. Fls. *regular* ... 322 Jasminum arborescens.

oo Hedge and garden shrubs.

Large sarmentose. L. broadly ovate pubescent beneath, Peti. ·5—1″. Fls. white, 2-lipped ... 408 Clerodendron phlomoides.

Large, erect. L. ell. or oblong, sessile, glabrous, 2″. Fls. showy, regular ... ... 278 Lagerstrœmia indica.

Erect with fœtid odour. L. ell. 6—10″ acute. Fls. 2-lipped white, spicate ... ... 391 Adhatoda.

Erect. L. 1·5—2″ glaucous beneath. Peti ·3—·5. Fls. small deep red (Sandal) .. ... 429 Santalum.

** Leaves palmi-nerved. Cp. p. 301.

Handsome shrub covered with strigose hairs. L. broad lanceolate 3—4″. Fls. mauve ... 275 Melastoma.

§§ Margins of leaves not entire. Cp. p. 301.

Leaves penni-nerved. To p. 305.

† Branches armed with thorns or prickles. Semi-wild or garden shrubs.

Aromatic. Branches with short prickles. L. rugose serrate. Fls. capitate ... ... 394 Lantana.

Usually thorny L. ·5—1·5″ ... 403 Gmelina asiatica

†† Unarmed.

(1) Leaves with minute peltate or glistening glands on under-surface.

Bark brown. L. ovate to obovate ·3 – 1·5″ lobed	403	Gmelina asiatica.
Sarmentose. L broadly ovate 1·5 — 3·5″, crenate or crenate-serrate	408	Clerodendron
Branches erect. L often ternate, sub-sessile, oblong or ell. 3—6″. Fls. blue, lipped	409	Clerodendron.
Tall. L ell. acuminate or lanceolate 2—4″ with cuneate base Fls. blue	411	Caryopteris.
Large sarmentose, hoary tomentose, usually climbing	412	Symphorema
Large erect white tomentose. L. crenate ell. or ell.-oblong 4—8″. Fls. small in panicled spikes ...	414	Colebrookia.
Shoots herbaceous L. ovate acute coarsely crenate, lower 4—5″ Very aromatic	413	Pogostemon.

(2) Leaves without distinct glands beneath (abundant on the inflorescence in 382).

Usually an undershrub. L. sessile 6—10″ narrowed to a cordate base. Fls. blue	382	Strobilanthes.
Usually sarmentose. L. nearly glabrous, lineolate, ovate 2—6″, decurrent at base	380	Petalidium.

** Leaves palmi-nerved. Cp. p. 304.

† Leaves with glands on lower surface (or obscured by pubescence in 408).

Sarmentose shrub	408	Clerodendron.
Erect, bushy. Branches fulvous-hairy. L. 4—8″ ovate, often cordate, serrate or denticulate, very rarely entire. Petiole 1—4″	410	Clerodendron infortunatum.

†† Leaves without glands (often dotted with cystoliths).

L. with 3 strong equal basal nerves, ovate 5—10″, coarsely toothed 484 Boehmeria.

B. Leaves alternate. Cp. p. 301.

§ Margins of leaves quite entire. To p. 309.

Leaves penni-nerved or venation obscure. To p. 308.

† Juice milky. Fleshy shrubs (see also young plants of No. 431).

Branches quill-like, unarmed. L. very small, caducous ... 430 Euphorbia Tirucalli.
Branches stout with pairs of stipular prickles. Stem single 4—6 ft.... 432 Euphorbia nereifolia.
Branches stout with pairs of stipular prickles at tip. Stems several from root 3—4 ft. ... ... 433 Euphorbia caducifolia.

†† Juice not milky. To p. 308.

(1) Fleshy jointed shrubs armed with slender spines. L. minute subulate, caducous (Prickly-pears).

Spines one only at each leaf site ... 285 Opuntia.
Spines several at each leaf site .. 284 Opuntia.

(2) Shrubs with numerous erect unarmed branches clothed with minute leaf scales.

Shrub 2—4 ft. Fls. pink. Seeds with hairs ... ... 20 Tamarix.

(3) Shrubs with normal leaves (see also Olax, Opilia and Cansjera which are shrubby in the open. Also 436 Cleistanthus which sometimes flowers as a shrub).

(*a*) Armed with thorns (see also 440).

x L. aromatic with pellucid glands, rarely entire, see species of Citrus and Atalantia 85—88 under Trees.

xx L. eglandular.

Branchlets rusty tomentose. L. 1—2·25″ pubescent ... ... 317 Diospyros Chloroxylon.
Branchlets pale. Smooth. L. 1—3″ glaucous beneath ... ... 444 Flueggia.

(*b*) Unarmed. Leaves glandular or scaly beneath.

x Numerous small red glands on under-surface.

Shrub 4—6 ft. with angled branches and lanceolate leaves. Small fls. in large folded bracts ... 188 Flemingia strobilifera.
Shrub 4—6 ft. with large ovate cordate leaves. Small fls., bracts under ·25″ ... ... 192 Flemingia paniculata.

xx Small round gland-scales on under-surface.

Tall 4—7 ft. L. long and narrow 3—10″, sometimes serrulate at tip ... ... 455 Homonoia riparia
Short, much branched. L. obovate to oblanceolate 1—2″, entire retuse or toothed ... ... 456 Homonoia retusa.

xxx Minute red and translucent glands sunk in the leaf margins and on inflorescence.

L. membranous ell, to obovate 2—6″. Petiole ·3—·5″. Fls. greenish-white ... ... 312 Embelia robusta.
L. rather fleshy, glabrous, 4—8″. Petiole stout ·25″. Fls. pink ... 313 Ardisia.

(*c*) Unarmed—Leaves without glands (inflorescence with stalked glands in 311 Plumbago).

Large. L. coriaceous ...	317	Diospyros Chloroxylon.
Large. L. thin 1—2″ rarely 3″ distichous, pale, tertiary n. reticulate. Fls. pedicelled ...	444	Flueggia.
Large. L. 2—4″ distichous, glaucous beneath, tertiary n. nearly straight. Fl. sessile ...	435	Bridelia Hamiltoniana.
Sarmentose, rarely with stipular thorns. L. ·5—1·75″ pinnately arranged, obtuse or rounded both ends	440	Kirganelia.
Large. L. 2—5″ obovate-lanceolate or narrow ell. acute. Fls. spicate (93, 113)	447	Antidesma diandrum.
Large. L. 2—4″ oval obtuse. Petiole ·17—·5″. Fls. spicate, spikes panicled	446	Antidesma Ghæsembilla.
Erect gregarious along river banks. L. ·25″ pinnately arranged ...	439	Phyllanthus Lawii.
Large. L. 1—1·6″ oblanceolate to cuneate-obovate, few on a twig	78	Erythroxylon.
Large. L. oblanceolate 1—4″ varnished and somewhat aromatic	131	Dodonæa.
Sarmentose. L. clustered 1·5—3″, often with opp. circinate tendrils below	77	Hugonia.
Sarmentose. Branches green. L. 2·5—3·5″ ovate or ovate-oblong narrowed into a short amplexicaul petiole ...	311	Plumbago.
Twiggy with small obovate fascicled leaves ·25—1·25″ ...	363	Ehretia microphylla.
Twiggy, along river-beds, branches very tough. L. linear to oblong-oblanceolate ·5—1·25″ ...	364	Rhabdia.
Stems slender erect strict. L. linear or oblong 1·5—3″ with thin brown hairs	142	Crotalaria juncea.
Garden shrub with brightly coloured or variegated leaves ...	452 453	Codiæum. Acalypha.

** Leaves palmi-nerved. Branches with stipular prickles. Cp. p. 306.
112 Zizyphus Jujuba.

§§ Leaves deeply 2-lobed at the apex, palmi-nerved. Lateral margins entire. Cp. p. 306.

Large. L. ·2—·3" split nearly half-way down. Hairy, beneath. Fls. white ... ... 225 Bauhinia tomentosa.
Large. L 2·5—7" often split, more than half-way. Fls. purple ... 229 Bauhinia purpurea.

§§§ Margins of leaves not entire Cp. p. 306.

* Leaves penni-nerved.

† Not found in river-beds.

Large, usually spinescent. L. coriaceous, sub-sessile, roundish, crenulate 1—3" ... ... 109 Gymnosporia.
L. obovate obtuse scabrous ·25—1·25", margin lobulate crenate or apex 3—5-toothed ... 363 Ehretia microphylla.

†† Plants confined to river-beds.

L. narrow, often serrulate towards apex ... ... 455 Homonoia riparia.
L. short obovate, toothed at the apex ... ... 456 Homonoia retusa.
L. linear-oblong ... ... 364 Rhabdia.

** Leaves palmi-nerved.

† Shrubs with stipular prickles.

Branches long, tomentose. L. 1·5—3" tomentose beneath serrulate ... ... 112 Zizyphus Jujuba.
Branches slender divaricate, zigzag. L. ·5—1" with short grey tomentum beneath apex often with few large teeth or serrulate ... ... 113 Zizyphus rotundifolia.

†† Unarmed.

(1) Margins of most leaves deeply lobed (exc. sometimes 62).

Branchlets stout. L. with stipitate viscid glands on margins and stipules	449 Jatropha gossypifolia.
Branchlets stout. L. 4—6″ diam. glabrous	448 Jatropha Curcas.
Tall sub-herbaceous 6—15 ft. L. 6—12″ diam. Cult. (castor-oil)	457 Ricinus
Stems many erect 3—5 ft. L. variable, upper small lanceolate lower 6—10″ nearly glabrous, base often 2-glandular	459 Baliospermum.
Bushy 3—5 ft. stellately pubescent. L roundish to broad ell. 4—8″	62 Grewia abutilifolia.

(2) Margins not deeply lobed (exc. sometimes 60, 61, 65, 67 and 69) Hairs stellate.

Stems usually several 1—3 ft. L. under 4″ roundish to oblong or obovate usually with cuneate base and rounded apex	65 Grewia sapida.
Stems usually several 1—3 ft. tomentose all over L. lanc. to ovate-lanc or oblong, suddenly acute or acuminate, green beneath Peti. under ·2″	60 Grewia hirsuta
Sarmentose. Stems 3—4 angled below. L. oblong 2—4″ green beneath	61 Grewia flavescens.
Erect. Branchlets hoary, L white beneath lanceolate 2—4″. Peti. under ·25″	67 Grewia Rothii.
Erect 3—6 ft. L. green ovate-lanceolate sub-cordate, lower up to 6″ softly hairy both sides. Peti. ·5—2″	69 Triumfetta pilosa.

II. Leaves with 2 leaflets.

Cp. pp. 301, 311 and 312.

Large, very thorny, shrub with grey green foliage ... 81 Balanites.

III. Leaves with 3 leaflets.

A. Leaves opposite, digitately 3-foliolate.

Large, aromatic shrub. *L.* 3—5-foliolate. Lflts. lanceolate entire or crenate white tomentose beneath ... ... 404 Vitex Negundo.

Rarely flowering as a shrub L. only pubescent along midrib ... 405 Vitex leucoxylon.

B. Leaves alternate.

§ Leaves digitately 3-foliolate.

Large shrub. Lflts ovate to ovate-lanceolate entire glabrous ... 13 Cratæva.

Scrambling or erect. Lflts. obovate, ovate, lanceolate, pubescent, serrate ... ... 133 Allophyllus.

§§ Leaves pinnately 3-foliolate. (*Vide* p. 292.)

Leaves dotted beneath with minute, usually red glands.

Tall, scarcely branched 5–8 ft. Lflts lanceolate 6 11″ Petiole long 5—6″ ... ... 190 Flemingia stricta.

Bushy 4—6 ft. Lflts. elliptic 4—5″, petiole 1·5—4″ winged or margined ... ... 193 Flemingia semialata.

Little branched 4—5 ft Lflts 2—3″, petiole ·25—·5″. Fls. capitate ... ... 196 Flemingia involucrata.

Branched 3—4 ft. Lflts. plicate 1·5—2·5″, petiole ·75—1″ ... 191 Flemingia lineata.

Branched 4—6 ft. Cultivated. Branches silky, grooved. Lflts. 1·5—2·5″ ... ... 181 Cajanus.

** Leaves not dotted beneath.

Branches 3-cornered, shaggy. Lflts. with 13—18 strong sec. n each side ... 166 Desmodium Cephalotes.

Branches several-angled, pubescent Lflts. with under 10 sec n. ... ... 165 Desmodium pulchellum.

IV. Leaves with 4 leaflets.

Cp. pp. 301, 311.

See No. 257 which sometimes flowers as a shrub ... 257 Pithecolobium.

V. Leaves with 5 or more leaflets.

A. Leaves opposite. See Nos. 404 and 405.

B. Leaves alternate. To p. 315.

§ Leaves simply pinnate (see also 212). To p. 313.

Leaves paripinnate. (*Vide* p. 295.)

Bushy 4—10 ft. Twigs and leaves hairy Lflts. oblong. Stipules large foliaceous ... ... 215 Cassia auriculata.

4—7 ft Twigs and leaves glabrous or nearly so. Lflts. lanceolate. Stipules small ... ... 216 Cassia Sophera.

8—12 ft. Lflts. linear-oblong 10—20 prs. ... ... 158 Sesbania ægyptiaca.

Weak 7—10 ft., branches muricate. Lflts. 20—40 prs. ... ... 159 Sesbania aculeata.

** Leaves imparipinnate. (*vide* p. 296.)

† Margins of leaflets entire.

(1) Lflts. with translucent glands.

Handsome shrub with box-like foliage or lflts. 1—3" ovate to obovate, sometimes notched at the tip, base oblique. Fls. pretty, white	82 Murraya exotica.

(2) Lflts. without translucent glands.

Bushy 4—8 ft. Lflts. 13—17, ·75—1"	152 Indigofera arborea.
Bushy 2—4 ft. Lflts. 3—5, ·5—1"	153 Indigofera paucifolia.
Large sarmentose, ultimately climbing. Lflts. 7—9, obovate-oblong 6—12"	156 Millettia auriculata.

†† Margins of leaflets not entire.

(1) Lflts. with translucent glands.

Strongly scented shrub. Lflts. 9—20 mostly alternate, oblique crenulate	83 Murraya Koenigii.
Strongly scented. Lflts. 5—9, opposite, glabrous, crenulate. Rachis winged	84 Limonia.

§§ Leaves twice-pinnate (or thrice-pinnate in sect.**) Cp. p. 312.

* More or less prickly. Lflts. small, rarely 1". To p. 314.

† Thorns terminal or axillary.

Thorns terminating the main rachis of a reduced bi-pinnate leaf ...	212 Parkinsonia.
Thorns axillary or terminating the *shoots, short. L. 1—3". Lflts.* ·05—1"	235 Dichrostachys.

†† Prickles stipular.

Prickles short. Bush with beautifully scented yellow flower-heads ...	240 Acacia Farnesiana.

††† Prickles numerous, scattered along the branches and often on rachis.

Erect garden shrub (Peacock flower). Rachis not prickly. Lflts. oblong ·5—1"	207 Cæsalpinia pulcherrima
Sub-erect, weak with several stems. Pinnæ 6--12 prs. Rachis with many recurved prickles Pod without prickles ., ...	238 Mimosa rubicaulis.
Similar to 238 but pinnæ fewer, 4—8 prs. and pod with aculeate prickles	239 Mimosa hamata.
Scrambling. Leaf rachis, thinly hairy or glabrescent, not prickly or prickles minute, under ·05". Lflts. ·25—·5". Pod short fleshy	206 Cæsalpinia digyna.
Scrambling. Leaf rachis densely brown hairy with numerous prickles ·05—·1". Lflts. oblong ·5—1". Pod dry, beaked with the style	208 Cæsalpinia sepiaria
Scrambling. Leaf rachis with numerous prickles and two large foliaceous often compound stipules at base. Lflts ovate-oblong ·5—1". Pod prickly short	205 Cæsalpinia Bonducella.

Unarmed (see also 237 which often flowers as a shrub). Lower leaves 2—3-pinnate. Lflts. 3—12" strongly serrate.

Stems annual 5—10 ft. Lflts. with 1—2 teeth to each strong sec. n., often with scattered erect hairs above, slightly hairy on nerves beneath	127 Leea aspera.
More woody 4—6 ft. Lflts. with 3—5 teeth to each strong sec. n. Branchlets, rachis and leaves beneath more or less pubescent or hairy	128 Leea robusta.
Woody 4—6 ft. Lflts with 3—4 teeth to each strong sec n.	

Branchlets, rachis and leaves glabrous	129 Leea sambucina.

β Parasitic shrubs (sending roots into the branches of other trees or shrubs). Cp p. 301.

Leaves O. Branches often whorled, flattened, contracted at the nodes	428 Viscum articulatum.
L. 1—1·5″, sub-sessile, faintly 3-nerved. Branches sometimes whorled	427 Viscum orientale.
L. 2—4″. Shoots and leaves covered with white or rusty tomentum. Fls. greenish ...	426 Loranthus scurrula.
L. 3—6″. Glabrous. Fls showy red or pink	425 Loranthus longiflorus.

PART III.—PALMS AND BAMBOOS.

I. Palms (a few others are occasionally cultivated).

Tall tree. Leaves large simple fan-shaped. Trunk smooth (Palmyra)	508 Borassus.
Tree. L. large pinnate 7—12 ft. Lflts. fascicled in different planes Petiole spinous and leaflets spinous tipped. Trunk clothed with petiole bases ...	509 Phœnix sylvestris.
Shrub. Stem very short and stout densely clothed with bases of petioles. L. pinnate 3—5 ft. Petioles with long spines ...	510 Phœnix acaulis
Shrub, scandent when well grown. Stems slender. L. pinnate 3—4 ft. with 25—30 prs. leaflets. Sheaths armed with flat and hooked spines	511 Calamus.

II. Bamboos (excluding cultivated species).

ulms 2—3″ diam. with very thick walls. Branchlets without thorns	518 Denrdocalamus.

Culms 4—6″ diam. Branchlets below with sharp thorns at the nodes...	519	Bambusa.

PART IV.—CLIMBERS (EXCLUDING SMALL HERBACEOUS CLIMBERS). To p. 330.

I. **Leaves simple** (O in Cuscuta and Cassytha; reduced to scales with clusters of acicular cladodes in Asparagus.) To p. 325.

A. Leaves opposite (see also Dioscorea). To p. 319.

§ Margins of leaves entire. To p. 319.

* Leaves penni-nerved (sub-palmi-nerved or sec. n. very close to base in 347, 352 and section ††) To. p. 318.

† Juice milky (sometimes sub-watery in 338).

(1) Leaves mostly under 4″, base not deeply cordate.

(*a*) Small subulate interpetiolar or intrapetiolar projecting glands present.

Branches pale. L. 1·5—3″ rarely 4—5″ usually glabrous, pellucid dotted sec. n. 6—9. Fls. m s. white ·5—·75″	336	Vallaris.
Branches rusty. L. 2·5—4″, shortly acuminate, sec. n. 4—5. Fls. small white panicled ...	339	Ichnocarpus
Slender twiner, glabrous or with white pubescence. L. from linear to broadly elliptic 2—3″ pale beneath and sometimes with pale streak above, mucronate Fls. very small purple axillary	340	Hemidesmus.
Large cultivated climber. L. 3—4″ oblong with over 12 fine spreading sec. n., glossy. Fls. over 2″	344	Cryptostegia.

(*b*) Subulate or glandular glands absent, or at base of leaf above.

Branches pubescent. L. dark green pubescent 1·5—2·5″, not mucronate Petiole ·25—·5″ ... 317 Gymnema.

Branches and leaves pale, minutely pubescent or tomentose beneath. L. 1·5—3″ with usually straight base, sometimes palmi nerved. Petiole ·5—1·5″. Fls. ·25″ ... 352 Leptadenia.

(2) Leaves mostly over 4″, not deeply cordate. Subulate axillary glands mostly present.

Strong climber. L. 4—5″ pale glaucous beneath. Sec. n. very fine spreading over 20, united into an intramarginal nerve ... 341 Cryptolepis.

Strong climber. Lower leaves attaining 10″ ovate to oblong, upper often oblanceolate 3—6″. Sec. n. 12—15 strong ... ... 338 Anodendron.

†† Juice not milky. To p. 318.

Stout, sub-scandent. Branchlets appressed hairy. L. ovate to ovate-lanceolate 3·5—6″, 2-glandular at base ... ... 79 Hiptage.

Large woody climber, shoots tomentose. L. mostly oblong 3·5—4·5″ shortly suddenly acuminate, old glabrous except in nerve axils, eglandular, sec. n. 5—7 ... 266 Combretum decandrum.

Large woody climber, shoots tomentose L. broad-elliptic to ovate obtuse or obtusely cuspidate, pubescent or copiously dotted with minute gland scales beneath ... ... 267 Combretum ovalifolium.

Large woody climber. Shoots and leaves persistently brown hairy.

L. ell. acuminate 3·5—5″ copiously covered with gland scales beneath ... ... 269 Calycopteris.

Woody, rarely climbing. L. long-acuminate, glabrescent eglandular 3·5—5″, sec. n. 7—8, petiole ·3—1″... ... ... 322 Jasminum arborescens.

Climbing. Branchlets pubescent. L. lanceolate to ovate acute mucronate ·5—2″. Cor. tube ·5—·7″ Jasminum angustifolium.

Climbing. Pubescent or glabrous. L. ovate, sometimes cordate obtuse mucronate ·5—2″, some at least with 2 rudimentary or subsidiary leaflets (3-foliolate) ... 323 Jasminum auriculatum.

** Leaves distinctly palmi-nerved, deeply cordate (exc. some leaves of 351 and 350). To p ·319.

† Juice milky (sometimes sub-watery in 351 and 350*).

(1) Leaves mostly under 4″. Glands present at base of leaf (exc. 345).

L. pale often closely resembling No. 352 but quickly glabrescent between the nerves, 2—4″ ovate acute or acuminate. Petiole 1—1·75″. Fls. ·75—1″ ... 351* Telosma.

Slender. Hairy all over. L. 2—2·5″ cordate ovate caudate. Petiole slender 1—1·5″. Glands not seen 345 Pergularia (Dæmia).

Dwarf. Stems pubescent L. 1·5—3″ (mature ?) broadly oblong or ovate-oblong cordate, obtuse or cuspidate, pubescent on nerves 348 Marsdenia Hamiltonii.

(2) Leaves mostly exceeding 4″. Glands at base of leaf (exc. 349).

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* Omitted from list. Occurs in South Chanda.

Stems stout corky lenticellate. L. 4—6″ hoary with minute curled pubescence ... ... 350 Marsdenia volubilis.

Stems stout ('5″ diam.). All parts densely velvety tomentose when young and pubescent in age. L. 4—7″ shortly finely acuminate base deeply cordate with the lobes often incurved 349 Marsdenia tenacissima.

L. 3—6″ ovate to ovate-oblong with deep basal sinus and incurved lobes, puberulous on nerves beneath, shortly sharply cuspidate. Peti '75—2″ ... 346 Holostemma Rheedii.

†† Juice not milky (see also Nos. 497—502 Dioscorea spp.)

L. orbicular deeply cordate suddenly acuminate 5'5—6″ densely appressed silky beneath. Fls small white panicled. Fr. winged 80 Aspidopterys.

§§ Margins of leaves not entire.

L. simple or ternate with large ovate acute lobes. Simple leaves 1—1'5″ ... ... 1 Clematis.

Hoary tomentose shrub. L. ovate coarsely toothed or crenate 4—8″, sub-palmi-nerved, gland-dotted and rough with hair bases when old. Petiole '5—'75″ ... ... 412 Symphorema.

Nearly glabrous twiner. L. 2—3″ with cordate or hastate base, toothed ... ... Thunbergia fragrans. (p. 179).

B. Leaves alternate or O. (opposite in 502, opp. and alt. in other Dioscorea). Cp. p. 316.

§ Margins of leaves entire. To p. 323.

Leaves penni-nerved (acicular in 505, rudimentary in 370 and 424). To p. 321.

† Branches with stipular prickles.

Shoots rusty. L. ell. to orbicular obovate up to 2·5″ often retuse.... 15 Capparis horrida
Branches gray. L. mostly under 1·5″ retuse. Fls. small white umbelled ... ... 16 Capparis sepiaria

†† Stems and branches with reflexed prickles. L. (cladodes) acicular ... 505 Asparagus.

††† Branches unarmed. Stout thorns on the trunk in 364.

(1) Slender filiform leafless parasites feeding by suckers on other plants.

Light yellow green fleshy thread-like stems. Fls. small 5-merous ... ... 370 Cuscuta.
Dark green, scarcely fleshy, thread-like stems. Fls. very small 3-merous ... 424 Cassytha.

(2) Slender climbing shrubs with tendrils. L. ovate or lanceolate 2·5″ ... 117 Helinus.

(3) Stout, sarmentose, scarcely climbing with opposite circinate woody tendrils below the cluster of leaves 77 Hugonia

(4) Often climbing by the long branches but not twining and without tendrils (branchlets often circinate in 111). Leaves usually bi-farious.

(*a*) Leaves mostly under 4". Sec. n. mostly weak.

Sarmentose. L. ·5–1·75" rarely with stipular spines ... ... 442 Kirganelia.

L. mostly oblong and obtuse 2–3", lower ovate, somewhat pubescent beneath, petiole ·2–·3" ... ... 104 Olax scandens

L. mostly lanceolate to ovate-lanceolate, acuminate, 1·5–3·5" glabrous, minutely lineolate and (translucent) dotted. Peti ·1–·15". Bracts orbicular ... ... 105 Opilia.

L. mostly lanceolate-ovate or ovate, acuminate, 2–4·5", glabrescent but usually puberulous on nerves, dotted as in 444, bracts subulate ... 106 Cansjera.

(*b*) Leaves mostly over 4". Sec. n. rather strong and raised beneath.

Branches green, often pubescent L. glabrous 3–5·5", usually faintly crenulate, tertiary nerve fine numerous parallel ... ... 111 Ventilago.

Branches brown-tomentose. L. 3–6", minutely dotted beneath and nerves brown-pubescent, tertiary n reticulate ... ... 364 Erycibe.

** Leaves palmi-nerved. Cp. p. 320.

† Stems prickly, at least below. To p. 322.

(1) Stout climbers with stipular tendrils.

L. 5–7·5" elliptic or ell.-ovate. Sheath of petiole winged and wing more or less auricled ... 504 Smilax prolifera.

L. 6—12″ broadly elliptic or orbicular, Sheath stout but not winged nor auricled ... 503 Smilax macrophylla.

(2) Twiners. Tendrils absent. Root not tuberous. Fls. showy.

Stems muricate. L. 2—4″ cordate ovate glabrous acute ... 369 Ipomœa muricata.

(3) Twiners with annual stems developing in the rainy season from large tubers. Fls. small greenish with 6 perianth lobes. Fr. 3-winged coriaceous.

Stems strongly characterised by the hard often aculeate bases of the fallen petioles and prickly below. L. mostly alternate sub-orbicular to ovate, cordate with large basal sinus ... 499 Dioscorea aculeata.

L. mostly opposite, lower cordate, upper not cordate ... 501 Dioscorea oppositifolia.

†† Stems not prickly.

(1) As in † (3) above. L. mostly over 4″ except near inflorescence, cordate (exc. some 501). (Dioscorea.)

L. mostly opposite, glabrous, pale green above, pale glaucous beneath, usually ovate oblong 501 Dioscorea oppositifolia.

Tubers and axillary bulbils elongate and clavate. L. opp. and alt dull dark green above, glaucous beneath, ovate deeply cordate, cross nervules strong parallel, main nerves decurrent as ridges on the petiole ... 500 Dioscorea belophylla.

Tubers and axillary bulbils round. L. sub-orbicular, not glaucous, with 7—11 primary nerves and strong parallel cross nervules. Sepals linear	497 Dioscorea bulbifera.
L. all opposite, thin, hairy all over or on the nerves when old ...	502 Dioscorea anguina.
L. opp. and alt., stems angled or winged. Cultivated Yam ...	498 Dioscorea alata.

(2) L. under 4″. Fls. small greenish. Fruit of one or more drupels (Menispermaceæ).

Stem corky. Branches with fleshy aerial roots L. ovate cordate glabrous 3—3·5″ ...	10 Tinospora.
Slender, grey villous L deltoid to ovate-oblong 2—3″ ...	11 Cocculus.
Slender, pubescent or glabrous. L. orbicular-reniform, often peltate, 1—3″	12 Cissampelos.

(3) Twiners. L. cordate. Fls. showy (Convolvulaceæ).

Stems and leaves beneath white silky. L orbicular cordate 2—3·5″. Fls white ...	365 Rivea.
Stems hairy L beautifully silvery silky beneath, hairy above, ovate cordate 3—5″. Fls. purple	366 Argyreia sericea.
Juice milky. Stems and leaves strigose. L. ovate up to 7″. Fls purple	367 Lettsomia.
Stems 3—4 angled or -winged. L. glabrous or pubescent 3—8″. Fls. white	368 Ipomœa Turpethum.

§§ Margins of leaves not entire. Cp. p. 320.

Leaves penni-nerved (sec. n. often near base in 108). Large woody climbers.

L. mostly obovate rounded with short acumination 2—4·5″ crenate. Peti. ·3—·7″ ... 108 Celastrus.

L. mostly ovate or ell. tapering, 3·5—5·5″. Peti. ·05—·3″ ... 111 Ventilago.

** Leaves palmi-nerved.

(1) Armed with stipular prickles. Tendrils O. L. serrulate or serrate.

Large woody climber with thorny bosses on the stems. L. 1—2·5″. Fr. black ... 114 Zizyphus Œnoplia.

Sarmentose or climbing. L. 2·5—6″ elliptic. Fr. white ... 116 Zizyphus rugosa.

(2) Small climber with stringing hairs. Tendrils O.

L. often lobed or pinnatifid, 1—4″, serrate, acuminate ... 460 Tragia.

(3) Woody rambling shrub, unarmed. Tendrils O.

Stem 3—4-angled below. L. oblong or ovate-oblong, stellately pubescent ... 61 Grewia flavescens.

(4) Sub-herbaceous climbers with tendrils. L. mostly 3—7-angled or lobed (Ampelidaceæ).

(*a*) Stem perennial, attaining 3—6″ diam. with thick corky bark.

Young leaves tomentose coarsely toothed, old 6—12″ repand denticulate ... ... 119 Vitis repanda.

(*b*) Stems dying down annually to the perennial root, or fleshy.

Stem 4-winged, fleshy, constricted at the nodes. L. 1—2″ ... 118 Vitis quadrangularis.
Stems not, or obtusely, angled, rather fleshy. L. 2—6″ pubescent 120 Vitis Linnæi.
New shoots glaucous. Stems round hollow. L. 4—8″ quite glabrous 121 Vitis latifolia.
Stems and leaves persistently tomentose. L. 6—10″, deeply 3—5-lobed ... .. 122 Vitis tomentosa.

II. Leaves simple but very deeply 2-lobed.

An immense climber with large palmi-nerved leaves and tendrils 231 Bauhinia Vahlii.

III. Leaves composed of three leaflets. Cp. pp. 316, 328.

A. Leaves opposite.

Lflts. subequal mostly 3-lobed .. 1 Clematis triloba.
Lower pair of leaflets much smaller than terminal, often reduced to mere auricles .. ... 373 Jasminum auriculatum.

B. Leaves alternate. To p. 328.

§ Leaves digitately 3-foliolate. (*Vide* p. 292.)

Weak sub-succulent climbers with tendrils. Lflts. crenate or dentate.

All parts covered, at least when young, with short pubescence .. 123 Vitis trifolia.
Covered with grandular bristly hairs 124 Vitis setosa.

Twiners from tuberous roots without tendrils, prickly below.

Lflts. 3, 5—8″ long, more or less obovate, caudate acuminate ... 495 Dioscorea daemona.

Lflts. 3—5, 3—5" long, obovate, acuminate or cuspidate ... 496 Dioscorea pentaphylla

§§ Leaves pinnately 3-foliolate. (*Vide* p. 292), leaflets usually stipellate.

Lflts. gland-dotted beneath, stipellæ sometimes rudimentary.

Stems pubescent. Lflts. rhomboid acuminate, lower 4—6", upper small ... ... 186 Cylista.

Slender. Stem hairy. Lflts. ell. to obovate ·6—2·25". Ped. grooved 185 Atylosia.

** Lflts. not gland-dotted.

† Forest species. To p. 327.

(1) Very large woody climbers attaining 1 ft. and more in girth, exuding red juice when cut.

Twining from right to left. Trunk with consecutive rings of red bast. Lflts. 4—9" minutely silky beneath, smooth above, small, cream coloured ... 174 Spatholobus.

As in 174 but lflts. ultimately quite glabrous ... ... 174 Var. denudafus.

Twining left to right. Lflts 12—18" sub-rugose and dull above, nervules pubescent. Fls. large, red 175 Butea superba.

(2) M. s. or slender climbers, stems not exuding red juice when blazed.

Large. Stems with concentric bast rings (1). Branches sparsely hairy. Lflts. lanceolate-ovate 3·5—6" shortly yellow—hairy beneath. Fls purple. Pod with plaited faces ... ... 171 Mucuna imbricata.

---

(1) This character requires confirmation.

Large. Stems without concentric bast rings (1). Bark stringy. Root large tuberous. Lflts. 6—10″ pale beneath with adpressed white hairs; short appressed hairs above. Fls. blue appearing when leafless. Pod slender constricted very hairy 177 Pueraria tuberosa.

Annual slender *Lflts.* 3—5″ *silky* beneath. Fls. purple. Pod turgid densely bristly ... ... 170 Mucuna pruriens.

Large sub-herbaceous. Lflts. (wild form) 2—3″ sparsely appressed hairy beneath on midrib above. Fls. rose. Pod smooth, fleshy ... 178 Canavalia.

†† Cultivated species. To p. 328.

(1) Tall climbers, or extensively rambling near the ground.

Lflts. glabrous or with few adpressed hairs, ell or ell.-ovate 3—6″, stipellæ minute, deciduous. Pod smooth with large seeds ... 178 Canavalia.

Lflts. hairy 3—4″, *deltoidly-ovate*, stipellæ acuminate persistent, ·1—·25″, stipules strongly nerved ·2″ inserted by their base ... 179 Dolichos Lablab.

Lflts. glabrous except on nerves 3—6″, ovate to ovate-lanceolate, often sub-hastate, stipellæ prominent ·1″ not acuminate, stipules ·3—·9″ inserted above their base 180 Vigna catjang.

(2) Dwarf climbers, or sub-erect.

L. strongly nerved. Fls. purple in long racemes ... ...179 Dolichos Lablab (var.).

L. finely nerved. Fls. purple capitate on long peduncles ... 180 Vigna catjang (var.).

Slender. Lflts. ovate thin 1—3·25″. Fls. 1—3 axillary. Pods 1—1·6″ curved with thin appressed hairs 183 Dolichos biflorus.

Slender. Fls. yellow on the tumid nodes of axillary racemes. Pods slender glabrous or hairy. Lflts. entire in some species, lobed, or deeply cut in others ... ... 184 Phaseolus spp.

---

(1) This character requires confirmation.

Stems sub-erect. Fls. yellow or reddish axillary, scarcely racemose, not on tumid nodes. Pods linear-oblong recurved, densely pubescent and hairy ... 182 Glycine hispida.

IV. Leaves composed of 5 or more leaflets, alternate. Cp. p. 325.

A. Leaves digitate or pedate.

Stout woody perennial with digitate 5–7-foliolate leaves Lflts 2—6″ glabrous ... ... 286 Heptapleurum.

Slender annual from tuberous root prickly below ... ... 496 Dioscorea pentaphylla.

Sub-fleshy climber with tendrils. Lflts. serrate, pedate or digitate ... ... 125 Vitis auriculata.

B. Leaves pinnate.

§ Leaves paripinnate.

Slender elegant climber. Lflts. ·5—·6″. Seeds white or red with black eye ... ... 169 Abrus

Strong spinescent climber with palm-like leaves ... ... 508 Calamus.

§§ Leaves imparipinnate (Leguminosæ).

Lflts. 7—9, strongly-nerved, silky beneath, obovate-oblong 3—8″, cuspidate ... ... 156 Millettia auriculata.

Lflts. 11—15, nearly glabrous or brown silky on midrib, oblong-obovate, 2—4″, cuspidate ... 155 Millettia racemosa.

Lflts. 7—13, light green, glabrescent 1—3″, broadly oblong, very obtuse and apiculate ... 201 Dalbergia volubilis.

Lflts. 7—13, dark green, minutely brown hairy beneath even when old, 1—3″, lanceolate to oblanceolate shortly tapering to a blunt or retuse tip ... 204 Derris scandens.

C. Leaves 2-pinnate (Leguminosæ).

§ Armed with prickles on the branches and, often, on the leaf rachis.

Fls. racemose, showy. Main nerve of lflts. not close to upper margin. Rachis eglandular.

Lflts. ·5—1″ ovate-oblong. L. with large foliaceous stipules. Pod prickly ... ... 205 Cæsalpinia Bonducella,

Lflts. ·5—1″ oblong. L. with small stipules. Pod oblong with sharp cusp ... ... 208 Cæsalpinia sepiaria.

Lflts. ·25—·5, 7—10 prs, oblong. Pod short fleshy 1—2″ ... 206 Cæsalpinia digyna.

Fls. very small, in panicled globose heads. Main nerve of lflts. very oblique or close to upper edge. Rachis with large gland near base and between upper pinnæ.

Lflts. ·3—·6″, 15—25 prs., oblong with unequal base. Pod fleshy 2—4″ ... ... 250 Acacia concinna.

Lflts. ·2—·3″, 30—45 prs., oblong, pubescent beneath. Pods dry brown ... ... 249 Acacia cæsia.

Lflts. ·1—·25″, 20—40 prs., linear, glabrous or nearly so. Pods dry purple... ... ... 248 Acacia pinnata.

§§ Unarmed.

Immense woody climber. L. ending in a 2-fid. tendril. Pods large woody ... ... 234 Entada.

PART V.—UNDERSHRUBS.

Plants not usually over 4 ft. in height, somewhat woody at base only; often with several stems from the root. *To end.*

I. Leaves simple. Cp. pp. 337, 338.

A. Leaves opposite. To p. 332.

§ Leaves with entire margins. To p. 332.

Leaves penni-nerved (all of this section are penni-nerved).

† Leaves gland-dotted beneath and aromatic.

Includes various herbs and small undershrubs not noticed in the list ... 190 Labiatæ.

†† Leaves not gland-dotted nor aromatic (but translucent marks due to cystoliths often present. Acanthaceæ exc. 268).

(1) Spinous.

Ditch or marsh plants with spinescent whorls of pretty purple flowers ... ... 379 Asteracantha.

Undershrub with glabrous elliptic leaves and yellow lipped flowers 383 Barleria Prionitia.

(2) Not spinous.

(*a*) Surface (usually upper) of old leaves *lineolate*, *i.e.*, marked with minute lines or dashes usually translucent, consisting of elongate crystals of oxalate of lime. (Sometimes obscure in 391, 390 and 389 or appearing as dots only.) Fls. 2-lipped (exc. 381).

L. small, surface hidden by white tomentum. Sepals beautifully reticulate	384 Barleria reticulata.
L. 4—8″ strigose on nerves, ovate, acuminate, decurrent on the petiole. Fls. blue in one-sided dense spikes	388 Barleria strigosa.
Erect or diffuse 1—3 ft. L. 2—5″ adpressed hairy, sub-acuminate both ends. Fls. rose 1·5″ clustered or shortly spicate ...	387 Barleria cristata.
Erect 2—4 ft. L. 5—6″, glabrous glaucous beneath, sub-acuminate. Fls. handsome rose 2″ axillary and in spikes 3—8″ long	385 Barleria montana. 386 B. Gibsoni.
Erect, cultivated only. L. ell. acute both ends 6—10″. Fls. large white spicate	391 Adhatoda.
Erect, slender 3—4 ft. L. acuminate, minutely hairy beneath, attaining 9″ below narrowed into petiole 1·5—2″ long. Fls. white in panicled clusters ...	390 Rhinacanthus.
Erect 2—4 ft. L. acuminate both ends, often shallowly dentate, 3—5″. Fls. small white rose-spotted in spikes with white green-veined bracts ...	389 Justicia Betonica.
Erect 2—4 ft. L. glabrous, or nerves pubescent, 5—8″ with 6—8 strong sec. n., base decurrent on the petiole. Fls. purple, subregular, in spikes with green-veined acuminate bracts ...	381 Dædalacanthus.

(*b*) Leaf surface not lineolate. Fls. regular

Small undershrub with racemes of greenish-yellow or white flowers and 4-winged fruits ... .. 268 Combretum nanum.

§§ Leaf margins not entire.

Leaves penni-nerved.

† Leaves minutely gland-dotted beneath and aromatic.

Stems 3—5 ft. L. ovate coarsely toothed. Fls. small pale rose clustered in dense panicled cymes. 413 Pogostemon.

L. often ternate oblong or elliptic 3—6″. Fls. large blue or whitish... 409 Clerodendron.

†† Leaves not glandular beneath.

Inflorescence very glandular. Fls blue. L. sessile 6—10″ ... 382 Strobilanthes.

Inflorescence not glandular. Bracts veined, fls white. L. petioled 2—6″ 380 Petalidium

Leaves palmi-nerved. See Nos. 410 and 484.

B. Leaves alternate. *To end.*

§ Leaves with entire margins (sometimes crenate in 76, repand in 168). To p. 333.

Leaves penni-nerved. To p. 333.

† Leaves with minute red glands beneath.

Stems 1—3 ft with broad-lanceolate leaves 3—7″. Branches with shaggy angles ... ... 189 Flemingia bracteata.

Stems 3—4 ft with lanceolate leaves 3—6″. Branches angled, not shaggy ... ... 188 Flemingia strobilifera.

†† Leaves not glandular beneath. Fls. regular.

Bright green. L. 1—3″ glabrous. Fls. yellow ·7—1″ diam. ... 76 Reinwardtia.

Branches sarmentose. L. 2—4″ mostly glabrous. Fls. white ·6″ diam. ... ... 311 Plumbago.

††† Leaves not glandular beneath. Fls. papilionaceous.

(1) Fls. yellow. Pod inflated, not jointed.

Strict 3—5 ft. L. linear or oblong 1—3″ ... ... 142 Crotalaria juncea.

Bushy 1—2 ft. L. oblanceolate ·7—1″. Inflorescence very glandular. 145 Crotalaria ramosissima.

Bushy 1—3 ft. L. oblanc.-oblong 1·5—3″ glabrous above, puberulous beneath. Racemes not glandular, bracts small ... 144 Crotalaria retusa.

Sub-herbaceous 2—4 ft. L. 3—6″. Bracts large ovate ... 143 Crotalaria sericea.

Sub-herbaceous 1—2 ft. L. 1—2″ linear or oblanceolate obtuse white silky beneath. Fls. in slender racemes. Pod exserted 146 Crotalaria albida.

Similar to 146 but more herbaceous. L. less white beneath. Pod included ... ... 147 Crotalaria linifolia.

(2) Fls. pink, purple, or white. Pod flattened, jointed.

Sub-erect or trailing. L. oblong 3—6″ with adpressed grey hairs beneath ... ... 168 Desmodium gangeticum.

Erect 3—6 ft. L. broad-ovate 3—6″ 168 Desmodium latifolium.

** Leaves palmi-nerved. Fls. large regular yellow.

Shrub 3—5 ft. with ovate leaves tomentose beneath ... 48 Thespesia (var.).

§§ Leaf margins not entire. Cp. p. 332.

Leaves penni-nerved, serrulate.

Leaves oblanceolate, stipulate. Fls. 1—1·5″ diam. handsome yellow 94 Ochna pumila

Leaves obovate, exstipulate. Fls. 2·5—3″ diam., purplish ... 274 Careya herbacea.

** Leaves palmi-nerved. Hairs stellate.

† Leaf margin simply serrulate to coarsely toothed, not angled or lobed (sub-lobed in some 23 and 34). To p. 335.

(1) L. 1—3″. Fls. not exceeding ·25″ diam. (Sterculiaceæ.)

Thinly stellate. L. oblong-ovate plaited. Fls. pink in heads ... 57 Melochia.

Tomentose or villous. L. oblong to ovate, plaited. Fls. yellow, clustered ... ... 58 Waltheria.

Glabrous. L ovate acuminate. Fls. purple, very small, cymose ... 59 Buettneria.

(2) L. 1—3·5″. Fls. ·3—·5 diam. straw-coloured or yellow (Malvaceæ).

Branches strigose. L. 1·5—3″ ovate to oblong-ovate obtuse ... 22 Malvastrum.

Slender, erect or diffuse 1—3 ft. branches with scattered hairs L. 1—3″ cordate ovate to broadly ovate acute or acuminate, hairs scattered. Peti. long ... 23 Sida veronicæfolia.

Erect As in 550 but covered with glandular (as well as stellate) hairs ... ... 24 Sida glutinosa.

Erect. 1—3 ft., tomentose all over. L 1—3″ cordate ovate. Peti. long ... ... 26 Sida cordifolia.

Erect or diffuse. L. 1—2·5″ rhomboid lanceolate to rhomboid-obovate, cuneate base usually slightly cordate on the petiole, pale beneath, more or less stellate. Petiole under ·25″ ... 27 Sida rhombifolia.

Sub-erect. L. ·7—1·5" much as in 553 with 1—3 spiny tubercles at base of petiole ... ... 25 Sida spinosa.

Erect or inclined. L. linear-lanceolate 1·5—3·5". Petiole ·2" ... 28 Sida acuta.

(3) L. 2—6" diam., usually orbicular cordate. Fls. 1—1·5" deep yellow. (Malvaceæ).

Erect, slender. Branches and leaves beneath thinly white tomentose. L. 2—3" ... ... 34 Abutilon indicum.

Erect 4—6 ft. densely villous. L. softly tomentose beneath, less so above 2·5—5" ... ... 35 Abutilon muticum.

Erect, stout, 3—6 ft. densely tomentose, glandular and hairy. L. 3—6" ... ... 36 Abutilon graveolens.

(4) Flowers red or white 1" diam. with 5—7 subulate bracteoles. (Malvaceæ).

Stems 1—2 ft. L. ovate or ovate-lanceolate strongly serrate, 1—3" often with a gland on the midrib beneath ... ... 37 Hibiscus hirtus.

†† Leaves distinctly angled or lobed at base of plant, or (71) unlobed. Fls. small yellow not exceeding ·75" clustered, closing towards noon. Fr. covered with spines. (Tiliaceæ.)

L. orbicular, white-tomentose beneath, 1—1·5", usually not lobed but irregularly toothed... 71 Triumfetta rotundifolia.

Lower leaves 3—4·5" with rounded base and 3-lobed top, upper ovate rhomboid or suborbicular ... ... 70 Triumfetta rhomboidea.

Lower leaves usually lobed, median usually ovate or ovate-lanceolate 3—6" hairy, upper lanceolate. Fls. ·75" when expanded 69 Triumfetta pilosa

††† Leaves distinctly angled or lobed, at least some of them.

Fls. white or pink or, if yellow, then over 1" diam. (Malvaceæ.)

(1) L. small to m. s. 1·5—3·5" deeply 3-lobed with lobes sometimes again lobed.

Or scarcely lobed. Fls. white 5—7" without bracteoles ... 38 Hibiscus Solandra.

(2) L. 2—3·5" diam. Fls. 1" pink, without bracteoles. Fr. with short spines.

Leaves angled, not divided beyond the middle ... ... 29 Urena lobata.
L. deeply divided into 5 oblong lobes ... ... 30 Urena sinuata.

(3) L. small, roundish or ovate, with several lobes. Fls. red with 8—12 linear bracteoles.

Glandular pubescent, L. shallowly lobed ·5—2". Carpels not winged ... ... 32 Pavonia odorata
Glandular pubescent. L deeply lobed. Carpels winged ... 33 Pavonia zeylanica.

(4) L 2—3·5" orbicular, deeply 3—5-lobed. Fls. white to pink 1" bracteolate.

Stems 3—4 ft. usually with harsh hairs. Bracteoles 5—6 deciduous, calyx spathaceous ... 44 Hibiscus ficulneus,

(5) Lower leaves usually over 4' often deeply lobed. Fls. large usually yellow with purple centre, bracteolate.

(*a*) Forest plants. Fls. yellow.

Tall 4—6 ft. Lower leaves 2—5″, 5-angled or lobed, upper narrow tomentose. Fls. 1—1·5″ ...	39 Hibiscus panduræformis.
Hirsute or bristly, lower leaves orbicular (sometimes not lobed) 4—6″, crenate upper usually sagittate. Fls. 3—4″. Bracteoles 10—15 filiform ..	45 Hibiscus cancellatus.
As in 570 but margins serrate, bracteoles 10 setaceous ...	47 Hibiscus rugosus.
Stems shortly pubescent. Lower L. 4—5″ with large acuminate lobes, dentate, pubescent and hairy. Fr. with reticulately veined wings .. .	40 Hibiscus vitifolius.
Branches with sparse hispid hairs. Lower leaves 5—8′ diam. with sparse 3-fid hairs. Fls. 2·5—3″. Capsule oblong with gland hairs .. .	44 Hibiscus tetraphyllus
Stems 4—6 ft. nearly glabrous. L. up to 9—10′ with 3 large acuminate entire lobes, glabrescent. Petioles up to 8″. Fls. 3—4′. Calyx truncate ..	48 Thespesia Lampas.

(b) Cultivated plants. Flowers often white.

Stem usually with scattered prickles, lower leaves sometimes not lobed. Fls. sub-sessile. Calyx with 5 large glands .	41 Hibiscus cannabinus.
Nearly glabrous. L. with gland on midrib. Bracteoles accrescent with calyx	42 Hibiscus Sabdariffa.
(6) Creeping pubescent shrub with milky juice and variously lobed, rarely unlobed, toothed leaves 2—5″ long	477 Ficus heterophylla.

II. Leaves 3-foliolate, alternate (Papilionaceæ. Cp. pp. 330, 338.)

L. with small red glands on under-surface.

Dwarf. 6—18" from perennial woody stock. Lflts. large 5·5—7". Peti. winged ... 194 Flemingia nana.

Diffuse 1—2 ft. with brown tomentose angular branchlets Lflts. 3—5" lanceolate. Petiole not winged 1—2" ... ... 195 Flemingia prostrata.

** Lflts. without glands. Sec. n. strong. Fls. small, white or pink.

Simple leaves often present. Lflts. broad ell., or ell.-ovate, end one 2·5—4·5" rounded both ends. Fls. in lax racemes, with hairy pedicels ·1—·15" ... 162 Uraria hamosa.

Simple leaves rarely present. Lflts much as in last Fls. in dense racemes. Pedicels often ·4" vey densely hairy ... 163 Uraria lagopus.

Branches gray hairy. Lflts. more ovate tapering to blunt apex, end one 3—4·5". Fls. hidden in pairs of sub-orbicular veined bracts ·5" diam ... ... 165 Desmodium pulchellum.

Branches 3-cornered with shaggy hairs. End lflt. 4—5·5" acuminate. Fls. in dense umbellate clusters along the branches ... 166 Desmodium Cephalotes.

Branches round with usually long hairs. Stipules persistent with long filamentous points. End lflt. obovate. 2—2·5". Fls. in close racemes 1—3" long ... 167 Desmodium polycarpum.

III. Leaves pinnate. Cp. pp. 330, 337.

§ Leaves paripinnate.

Gregarious, herbaceous 1—2·5 ft. Lflts. 3 prs. obovate ... 218 Cassia tora.

Often sub-gregarious 2—4 ft. Lflts. ovate 3—5 prs., 1·5—4″ long...	217	Cassia occidentalis.
Erect 3—10 ft. with muricate branches. Lflts. 20—40 prs., ·5—·7″. Pod very long and slender	159	Sesbania aculeatea.

§§ Leaves impari-pinnate (sometimes ending in a point in Aeschynomene).

Habit of 159 but 3—6 ft. only, usually minutely muricate. L. 2—4″. Lflts. 41—81, ·1—·2″. Pod 1—1·7″ jointed ...		Aeschynomene indica.
Robust, soft wooded with large pith. L. 3—6″. Lflts. 61—101. Pod 2″	160	Aeschynomene aspera.
Shrubby, gregarious, 1·5—2·5 ft. Lflts. 9—19 oblanceolate obtuse or retuse ·75—1″ ...	154	Tephrosia purpurea.
Sub-herbaceous 2—3 ft. Lflts. 5—7, linear-oblong, 2·5—4·5″, lower sometimes simple ...	161	Uraria picta
Herbaceous from perennial root. Lower leaves 1—2 very large ovate 1—2 ft. Upper very few pinnate with few leaflets ...	126	Leea macrophylla.

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APPENDIX.

GLOSSARY OF BOTANICAL TERMS USED IN THE FLORA.

Accrescent, continuing to grow ; enlarged.

Acicular, needle-like, long slender and rigid.

Acroscopic, looking towards the tip of the shoot.

Aculeate, prickly, usually applied to somewhat curved prickles like those of a rose, and which are not morphologically branches.

Acuminate, ending in a tapering apex.

-adelphous, combined in groups.

Adherent, when the members of a flower become united in the course of growth to the members in a different whorl and of a different character, *e.g.*, when the stamens become united to the corolla. Cp. coherent.

Adhesion, the state of being adherent.

Adnate, see adherent. Adnate anthers, see Anthers.

Albumen, a general name for the nutritive tissue stored up in a seed outside the embryo, whether endosperm or perisperm. Albuminous, containing albumen.

Alternate, the position of lateral members on an axis when neither opposite nor whorled.

Andrœcium, a collective word for all the stamens in a flower.

Anterior, the side remote from the parent axis, the ventral side. The antithesis to posterior. Unless twisting of the pedicel has taken place the anterior sepal or sepals of a flower in an inflorescence will be the lower sepal or sepals, the upper one or ones will be called posterior and the side ones lateral.

Anther, that part of the stamen which contains the pollen. In Flowering Plants it usually consists of 2—4 cells or loculi. The cells or loculi often coalesce so that only two or even one cell is present in the ripe anther. When the loculi lie their whole length on the relatively broad connective, which then appears as a continuation of the filament, the anther is called *adnate*. When the filament appears to end at the base of the anther, the latter is called *innate*. If the anther swings freely on the top of the filament, it is called *versatile*.

Apetalous, without petals or corolla.

Apocarpous, see ovary.

Aril, an envelope which grows up from the base of the seed and more or less completely covers it. It is usually fleshy, *e.g*, the flesh on the Litchi seed, the red covering on the Kujri (Celastrus paniculatus) seed.

Auricle, an ear-like appendage.

Awn, a rigid very fine or almost hair-like terminal appendage, *e.g.*, the appendage on the ears of barley or the terminal twisted appendages of the Spear-grass.

Axil, the upper angle formed by an axis and a lateral member, such as the angle formed by a leaf-stalk with the stem from which it springs.

Axillary, situated in an axil.

Axis, any member which bears lateral subsidiary members may be called the axis of such subsidiary members.

Baccate, berry-like.

Bark, all the tissues alive or dead situated outside the cambium ring.

Basal-nerved, with several equally, or subequally, strong main or primary nerves starting from the base, cp. penni-nerved. See also Nervation.

Basifixed, fixed by the base to the stalk. Cp. peltate, dorsifixed, etc.

Bast, a system of tissues distinct from the Xylem or wood and in Dicotyledons lying mostly outside it. The tissues of most economic importance in the Bast are the *fibres* which yield such material as jute, hemp, and other textiles.

Beaked, provided with a firm excurrent solid or narrowly tubular prolongation which is often sharply marked off from the body of the organ. (The term is not applied to leaves.)

Berry, typically a fleshy indehiscent fruit with many seeds. The covering or pericarp consists of a thin skin or epicarp, a fleshy portion or mesocarp, and sometimes a firmer hard inner portion or endocarp. Where however the endocarp becomes stony or hard the fruit becomes a drupe. Examples of a berry are Mehrli (Flacourtia), Brinjal (Solanum). The term is sometimes extended to include fruits which are not *typical* berries but which resemble a berry in most characters.

Bifid, 2-fid, divided into two parts about half-way down.

Bi-pinnate, pinnate with the pinnæ, or some of them, again pinnate.

Bi-pinnatifid, pinnatifid with the segments again pinnatifid.

Bisexual, 2-sexual, containing both fertile stamens and carpels with ovules.

Bract, a reduced leaf. Bracts are usual on an inflorescence and often bear a flower in their axils.

Bracteole, small bracts occurring on the axis of a next higher order than that on which the bract is situated. If bracts and bracteoles appear to arise from the same axis, the bracteoles will usually be in a different position, thus in dicotyledons if the bract is ventral the two bracteoles if present are usually lateral.

Caducous, quickly falling off.

Calyculus, (1) a calyx-like assemblage of minute leaves subsidiary to the true calyx and outside of it or (2) a calyx-like organ, *e.g.*, in some Loranthaceæ of which the morphology is doubtful, and may be a part of the torus (as in Escholtzia).

Calyx, the outer of the floral envelopes where these are differentiated into calyx and corolla. The term is also used where the inner floral envelope or corolla is considered as suppressed. See flower.

Calyx-tube, the tube or cup formed by the cohesion of the leaves of the calyx. Also applied to an annular zone of the torus which grows up and bears the calyx or sepals, and frequently other members such as petals, etc., on its edge. See, however, Hypanthium.

Capitate, clustered together into a head or ball. (2) Knob-like.

Capsule, a form of fruit which becomes dry when ripe and opens by two or more valves.

Carpel, the modified leaves which bear the ovules. The carpels occupy the centre of the flower when present (*e.g.*, in female or hermaphrodite flowers) and together form the ovary. q. v.

Caudate, furnished with a long slender tail-like tip.

Cladode, a leaf-like branch of only one internode, *e.g.*, the so-called "leaves" of Asparagus.

Clavate, club-shaped.

Claw, the narrow or stalk-like base found in some petals.

Coccus, one of the lobes of a fruit, each of which is usually derived from a single carpel of the ovary, and when ripe, becomes more or less detached from the other cocci and often from the floral axis. Cocci may be dehiscent or indehiscent.

-coccous, in composition, *e.g.*, 5-coccous mep anscomosed of 5 cocci.

Compound, composed of two or more similar parts, thus a compound leaf is composed of two or more separate leaflets, a compound inflorescence of smaller inflorescences.

Connate, united one to another. The term is used of similar parts only such as sepal to sepal or petal to petal, etc., *e.g.*, the petals of the Cotton plant; but the union of dissimilar parts, as, *e.g.*, petal to sepal would be termed "adnate."

Connivent, weakly cohering or adhering.

Contorted, applied to a bud in which the parts have their margins overlapping and are at the same time rolled up.

Convolute, rolled up.

Cordate, shaped like the conventional heart (as on playing cards), or with the base heart-shaped.

Coriaceous, leathery.

Corolla, one of the envelopes of the flower and a collective name for the petals. The corolla if present is usually situated within the calyx, but rarely the calyx is absent. It may usually be distinguished from the calyx not only by its position but by its peculiar texture and colour, *e.g.*, the red petals of a rose.

Corona, a ligular outgrowth from the corolla or petals on the inside which sometimes appears like a second corolla, *e.g.*, in Pancratium and Daffodil.

Corymb, a form of inflorescence in which the several branches or flower-stalks arising at different levels reach more or less the same level at the top.

Cotyledon, a leaf present on the embryonic plant while yet in the seed. The cotyledon (in Monocotyledons) or cotyledons (in Dicotyledons and Gymnosperms) in some species never expand but are absorbed by the germinating plant, in other species they appear above ground as the first green leaves of the plant.

Cusp, a short hard point or tip; sometimes also used in the sense of a short pointed tip from an otherwise obtuse leaf.

Cuspidate, furnished with a cusp; in the second sense sometimes used as a short expression for abruptly acuminate.

Cyme, a system of branching in which the main axis ceases to grow or terminates in a flower, the secondary or lateral axes from beneath the apex continue to grow beyond the parent axis and may be likewise superseded by branches or axes of a higher order. Cp. raceme.

Deciduous, falling off. Cp. caducous.

Declinate, inclined to one side, and often ascending at the tip.

Decussate, in planes at right angles to one another.

Definite, not varying in number.

Dehisce, to open by the separation of the walls or valves.

Dehiscent, dehiscing when ripe.

Dentate, with teeth projecting more or less perpendicularly from the margin.

Denticulate, with little teeth, or points along the margin.

Diadelphous, 2-adelphous, in two bundles. A term applied to stamens which are grouped into two lots; one lot may, however, contain only one stamen.

Didynamous, in two unequal pairs.

Digitate, spreading like the fingers of the hand. In the case of digitate leaves, each leaflet is properly provided with a short stalk or petiolule, if this is absent the leaf is palmately-compound or palmati-partite. (q. v)

Dimorphic, occurring in two different forms. Syn. Dimorphous.

Diœcious, where the sexes occur on different individuals, the male flower on distinct trees from the female, as, *e g.*, usually in the Papaya (Carica).

Disc, a swelling or swellings, sometimes glandular, of the torus inside the calyx and usually inside the andrœcium.

Distichosu, disposed alternately in twc opposite rows.

Divaricate, spreading in opposite directior from a common base.

Dorsal, situated at the back of; same as posterior. See anterior.

Dorsifixed, fixed by the back of, in contrast to the state of being attached by the end or margin.

Drupaceous, more or less resembling a drupe.

Drupe, a form of fruit consisting of a more or less succulent pericarp which encloses a single 1-many-celled stone, *e.g.*, a plum. The stone in a drupe is the inner portion, or endocarp, of the fruit, and is to be distinguished from a hard testa of a seed. The stone may contain one or more seeds.

Drupel, each of the small drupes which may be formed from an apocarpous ovary.

Ebracteate, without bracts.

Emarginate, having a deep dent at the apex. If the dent is broader and shallower it becomes retuse.

Embryo, the new plant from the time of its inception in the fertilised ovule and until the germination of the seed.

Endosperm, the tissue formed within the embryo-sac or macrospore subsequent to fertilisation (in the case of Angiosperms, and destined to feed the embryo. In Gymnosperms the prothallium (though a secondary endosperm may be also developed).

Entire, with the margin or edges not toothed or cut but even and continuous.

Epicalyx, a whorl of bracts just beneath the calyx and in some respects resembling it, in other cases stipular appendages of the sepals which also resemble a secondary exterior calyx.

Epicarp, the outermost layer of the fruit.

Epigynous, an epigynous flower is one in which the torus or receptacle grows up at the circumference carrying with it the calyx, corolla and stamens and completely enclosing the ovary. An epigynous calyx, stamens, etc., refers to this superior position with regard to the ovary or pistil. Cp. perigynous.

Epipetalous, situated on the corolla or petals. The position of epipetalous stamens may be either due to the growth of a common zone of the torus carrying with it both petals and stamens, or to the growing up together of both corolla and stamens (*i.e.*, adhesion of corolla and stamens).

Epiphyte, a plant which grows upon another plant without, however, drawing its nutriment from the living parts of such other plant. Cp. parasite.

Exalbuminous, without albumen.

Excurrent, running out beyond the margin.

Extra-axillary, situated away from the axil of the leaf to which it is nearest.

Fascicled, closely aggregated.

Female, a female flower is one which bears an ovary containing ovules capable of fertilisation and becoming seed, and does not bear stamens. A flower which only bears an imperfect or functionless ovary (pistillode) is not considered a female flower. A female plant is one which only bears female flowers.

Fertile, a fertile flower is synonymous with a perfect female flower. A fertile stamen is one that develops functional pollen, in contradistinction to a staminode. A fertile frond in a fern is one that bears sporangia.

-fid, used in composition, divided about half-way down. Cp. -partite, -lobed, -sect.

Filament, the stalk of an anther, *i.e.*, the lower part of a stamen. It may, however, be absent, in which case the anther is sessile.

Filiform, very slender, hair-like.

Flower, the organs of reproduction (stamens or pistil) together with the usually more or less modified portion of the axis (torus, receptacle) on which they are inserted, and together with the specialised leaves (perianth, calyx, corolla), if any, which surround or envelope these organs.

A typical 2-sexual flower consists of (1) two circles (whorls) of perianth leaves, the outer of which is green and herbaceous (calyx), the inner (corolla) white or coloured and of different texture (petaloid), (2) one or more whorls of male organs (stamens), (3) one or more carpels which bear the ovules. All or some of the above parts may be arranged spirally in some flowers, and any or all may be absent with the exception of a single stamen or a single carpel.

-foliolate, in composition refers to the leaflets in a compound leaf, *e.g.*, 3-foliolate means with 3-leaflets.

Free, not united with other members.

Fruit, the ovary (in the case of an apocarpous ovary, all the carpels) and its contents after the fertilisation of the ovules, including in the case of inferior ovaries the accrescent or investing part of the floral axis, *e.g.*, apple.

Gamo-, in composition means united or in one piece, *i.e.*, not divided to the base into separate members, *e.g.*, *gamophyllous*, with the perianth leaves united at least below; *gamopetalous*, with the corolla more of less tubular below, etc. The term is used even where theoretically, perhaps, the lower or tubular portion is an annular zone of the floral axis of the same texture as the leaves, petals, etc., concerned.

Glabrous, without any hairs.

Glabrescent, with deciduous hairs, becoming glabrous

Glaucous, of a blue-green colour.

Glume, the bracts and bracteoles on the spikelets of the grasses and sedges.

Gonophore, an internode of the floral axis between the corolla and stamens, and hence bearing both the stamens and the pistil. Cp. Gynophore.

Gynophore, an internode of the floral axis between the stamens and the pistil, so that the pistil is considerably separated from the stamens. Cp. Gynophore.

Hairy, clothed with somewhat long, not very dense hairs. Cp. pubescent, villous, etc.

Hermaphrodite (flower), a flower in which both stamens and ovary are present and functional.

Hirsute, with a thick covering of somewhat firm moderately long hairs. Cp. hairy, pubescent, villous, etc.

Hispid, with short scattered very stiff hairs or bristles, sometimes the base of the hair only is stiff. A hispid surface feels harsh to the hand.

Hoary, grey or white.

Hypanthium, a more or less tubular or flask-shaped zone of the floral axis which grows up above the level of the ovary and bears on its margin or at a different level the floral envelopes and andrœcium. It is sometimes constricted above the ovary and prolonged into a 'beak' above it. It is either green or coloured, especially in fruit. The ovary may lie free within it or be closely invested by (adnate to) it, in which case it may be referred to as the ovary-wall. See also Calyx-tube.

Hypogynous, situated on the torus at the same level as, or below the level of, the base of the ovary. Cp. perigynous, epigynous.

Imbricate, overlapping, with one sepal, petal, etc., outside all the others (*i.e.*, its margins are free) and one inside all the others.

Indefinite (often written ∝), of varying number and usually numerous.

Indehiscent, not opening by valves or pores. The liberation of the seeds of an indehiscent fruit takes place through the consumption of the fruit by animals, or through the rotting of the pericarp.

Inferior, an inferior calyx, stamens, etc., implies insertion at a level below or near the base of the ovary; an inferior ovary implies that the sepals, stamens, etc., are inserted on the torus at a level above, or near the top of the ovary. Cp. epigynous.

Inflorescence, an axis or assemblage of axes especially devoted to the bearing of flowers and including the flowers and their bracts and bracteoles

Innate, said of stamens in which there is a distinct transition from, or articulation between, the anther and the filament in contradistinction to one in which the connective appears merely as a continuation of the filament. Cp. adnate.

Internode, the space between two leaves or metamorphosed leaves.

Interpetiolar, said of stipules situated between the bases of opposite leaves, and which are frequently more or less connate so that each pair, made up of one from each leaf, may resemble single stipules.

Intrapetiolar, said of stipules when each pair of a single leaf unite together within the axil of the leaf.

Involucre, an assemblage or whorl of bracts or leaves situated close beneath a flower or inflorescence.

-regirular, unsymmetrical, *i e.*, not being capable of division into two similar halves by any plane parallel to the axis. Sometimes also used for flowers in which some of the members in the same whorl differ from others but in which the flowers can be divided medianally into two ismilar halves. See zygomorphic.

Lanceolate, shaped like a lance head. A lanceolate leaf may or may not taper as much at the base as at the other end, but if it is much wider near the base the leaf will become *ovate-lanceolate.*

Lenticel, cortical pores. Usually lens-shaped or elongate small dots or excrescences on the bark, they are filled with loose tissue, the intercellular spaces of which serve as a passage for oxygen into the inner tissues.

Limb, the expanded part of a corolla, petal, etc., in contradistinction to the tube or claw.

Lobed, cut less than half-way down into more or less rounded segments.

Loculicidal, a mode of dehiscence in which rupture takes place through the middle of the outer wall of each loculus. Cp. septicidal.

Male flower, a flower which bears fertile stamens but not fertile carpels. An abortive pistil may be present in a male flower or not.

-merous, in composition, indicates the number of members in each whorl, *e.g.*, 5-merous.

Monadelphous, more or less united into one bundle by the filaments.

Monœcious, bearing both male and female flowers on the same individual.

Mucronate, tipped with a short hard usually blunt point.

-nate, used in composition, arising from the same point or whorled, *e.g.*, ternate leaf, with 3 leaflets digitately arranged.

Nervation, the arrangement of the fibre-vascular bundles in the leaves

Node, the plane of insertion of a leaf on the axis.

Ob-, in composition means inversely, thus an ovate leaf has the wider part towards the base, an ob-ovate leaf is inversely ovate and has the wider part towards the apex.

Oblong, longer than broad and with the sides more or less parallel.

Opposite, on different sides of the axis with the bases on the same level.

Ovary, the part of a flower which contains the ovules and consisting of one or more carpels which cohere by their edges to form one or more closed cells or chambers, the cells of the ovary. An ovary is apocarpous if the carpels composing it are free from one another, in which case each carpel forms a separate chamber by the incurving and meeting of its edges (see suture). An ovary is syncarpous if the carpels composing it are united to one another. A syncarpous ovary is 1-celled where the component carpels only cohere by their edges or where the coherent edges are incurved without reaching the axis, it is 2- or more-celled where the coherent edges of the carpels are sufficiently incurved to meet one another in the axis of the ovary, so as to form walls, or septa. Septa sometimes arise also by vertical walls between the axis of the ovary and the midribs of the carpels. (See also Pistil.)

Ovate, egg-shaped with the broader end towards the base.

Ovate-lanceolate, ovate-oblong, etc., between ovate and lanceolate, between ovate and oblong, etc

Pale, palea, (adj. paleaceous), a chaffy scale; specifically the upper of the two bracts which subtend a flower in the Gramineæ. The palea of the Gramineæ is most frequently 2-nerved and may possibly represent two connate sepals of the outer perianth whorl.

Palmate, radiating like the spread fingers of the hand. A palmate leaf may have the segments cut nearly to the base, but if the leaf actually becomes compound from the sinuses reaching the petiole it becomes *digitate.*

Palmi-nerved, with the primary nerves radiating from the apex of the petiole.

Panicle, a repeatedly branched inflorescence.

Parallel-nerved, with the numerous nerves from the base running more or less parallel and close to one another, as, *e.g.*, in the leaves of Bamboos, etc.

Parasitic, drawing sustenance from the living tissues of other plants.

Paripinnate, pinnate with the leaflets in pairs and no terminal leaflet.

-partite, in composition means cleft considerably beyond the middle. Cp. -fid, -lobed.

Pedicel, a small stalk, especially the stalk of a single flower of an inflorescence to distinguish it from the peduncle.

Peduncle the stalk of an inflorescence, or of a single flower when the inflorescence is 1-flowered.

Pellucid, translucent.

Peltate, shield-shaped, round, like the indusium of some ferns; (2) of leaves, attached to the petiole in the centre of the blade, or at least not by the margin.

Penni-nerved, with one midrib and secondary nerves from it. Cp. Nervation, basal-nerved.

Perianth, a general term for the floral envelopes including both calyx and corolla, but more especially when there is no such differentiation into calyx and corolla.

Pericarp, the whole outside of the fruit including the epicarp, mesocarp and endocarp.

Perigynous, a term applied to the flower or to the sepals, petals, or stamens when these are raised on a zone of the torus above the level of the base of the ovary when the ovary is free in the tube so formed or only adnate by means of the intercalated disc. Cp. hypogynous, epigynous.

Petal, one of the divisions of the corolla.

Petaloid, of a more or less delicate texture and white or coloured. Cp. sepaloid.

Petiole, the stalk of a leaf.

Petiolule, the stalk of a leaflet in a compound leaf.

Pilose, with rather long, not dense nor very silky hairs.

Pinnate, a compound leaf with two or more leaflets springing from each side of the axis or rachis. If the leaflets are odd so that the rachis terminates in a leaflet, the leaf is imparipinnate, if the leaflets are even with no terminal leaflets, the leaf is paripinnate. If the rachis of the leaf bears one or more pairs of secondary rachides which latter bear the leaflets, the leaf is bi-pinnate. If the secondary rachides bear again rachides the leaf is tri-pinnate and so on.

Pinnatifid, deeply lobed to about half-way down or more, with the lobes pinnately arranged.

Pistil, a collective word for the ovary, style and stigma.

Pistillode, a rudimentary pistil.

Placenta, the surface to which are attached the ovules.

Polygamous, bearing male, female, and hermaphrodite flowers on the same plant.

Polygamous, with the petals not combined into a tube.

Puberulous, slightly pubescent.

Pubescent, covered with close short fine hair. Pubescence is a denser shorter state of hairiness than hairy.

Punctate, marked with small dots.

Pungent, with a pin-like point capable of penetrating the flesh.

Putamen, the hard endocarp, especially a many-celled endocarp, of fruits.

Pyrene, when a putamen breaks up o
ripening into several parts each enclosing a see
each such part is called a Pyrene. Cp. coccus.

Raceme, an inflorescence in which the ma
axis continues to grow and the lowest flowe
are the oldest and open first. Racemose, a for
of branching in which the main axis continu
to grow and always remain stronger than th
lateral axes which successively spring from it
Cp. cyme.

Rachis, that part of a pinnate leaf whic
bears the leaflets; in a bi-pinnate leaf the pr
mary rachis bears the pinnæ, the secondar
rachides the leaflets. (2) The axis of an inflo
escence.

Rachilla, the axis of the spikelet of grasses.

Receptacle, the portion of the axis on which is situated the florets in a capitate inflorescence, or on which is situated the parts of the flower in a flower.

Regular, with all the members symmetrically disposed around the geometric centre of the flower, and with either all the members in a single whorl equal and similar or if dissimilar, then with one-half of the whorl similar to the other half.

Retuse, with the apex depressed so that there is a sinus at the tip, which is less deep than in emarginate.

Rhizome, an elongated underground stem with apical growth.

Rotate, a corolla with a very short tube and a horizontally spreading limb.

Salver-shaped, with a long tube and comparatively short horizontally spreading limb.

Samara, a fruit with the pericarp compressed and expanded into a wing, or each part of a schizocarpous fruit in which the pericarp is thus modified.

Saprophyte, a plant which feeds upon decayed organic matter.

Sarmentose, with long arching slender branches which are often sub-scandent.

Scabrid, covered with small hard hairs or points so as to feel rough to the touch.

Seed, the ovule after fertilisation and development of the embryo. The seed consists of the more or less modified integuments of the ovule which become the testa or seed coat (see also aril, arillus), sometimes a part of the tissue of the nucellus which becomes filled with food material (perisperm), frequently a tissue which has become developed inside the embryo-sac (endosperm), and finally the more or less completely developed and differentiated embryo.

Sepal. one of the divisions of the calyx.

Sepaloid, green and resembling a sepal in texture rather than a petal. Cp. petaloid.

Septicidal, a mode of opening of a fruit by means of a split through the median plane of the interior walls or dissepiments so that the fruit becomes more or less separated into its component carpels The separation usually begins by an opening at the tip of the fruit. Cp. loculicidal.

Septum, an interior wall.

Serrate, toothed like a saw with the teeth inclined forwards.

Serrulate, serrate but with the teeth minute.

Sessile, without a stalk.

Simple, not composed of a number of similar parts, opposed to compound. A leaf is simple even if segmented provided that the divisions are not separated by portions of the axis destitute of blade.

Spathe, a large bract which sheaths an inflorescence of part of an inflorescence, at least in its young state.

Spathaceous, sheathing and not divided up into distinct sepals, petals, etc.

Spicate, spiked, with the flowers in a spike, q. v.

Spiciform, resembling a spike in appearance

Spike, a form of racemose inflorescence in which the flowers are sessile on the axis.

Spadix, a spike with an enlarged fleshy axis and usually enclosed when young in a spathe.

Spikelet, the ultimate parts of the inflorescence of grasses (rarely an inflorescence consists of only one spikelet) and Cyperaceæ are called spikelets. A spikelet in the grasses consists of an axis (rachilla) with usually three or more distichously arranged bracts (glumes) of which the lowest two (one or more) are usually empty and others contain an opposing bracteole (pale) and a male or female or 2-sexual naked flower. See also glume, pale, lodicule.

Stamen, a modified leaf which bears the microsporangia or pollen sacs. A typical stamen consists of a stalk (filament) and the specially modified part (anther) which bears the pollen-sacs. See also anther.

Staminodes, imperfect or reduced or rudimentary stamens which do not bear the fertile ollen.

Stellate, spreading in a star-shaped manner.

Stigma, the part of a carpel especially adapted by means of papillæ, viscosity, etc., to receive the pollen grains. The stigmas of the several carpels forming an ovary may be separate or united, stalked or sessile.

Stipule, (adj. stipular), stipules are a pair of processes (often absent) one of which springs from either side of the leaf base (*i.e.*, where the stalk of the leaf or the base of a sessile leaf leaves the stem) and either membranous or foliaceous in texture, usually small but sometimes exceeding the leaf-blade (which they often protect) in bud.

Superior, situated above another member. A superior ovary has its base above the insertion of the calyx, a superior calyx is inserted at a level above the top of the ovary.

Ternate, 3 members digitately arranged, or starting from the same node.

Testa, the outer covering of a seed.

Tomentose, with exceedingly close matted short pubescene.

Tri-pinnate, with the primary axis of the leaf pinnate with one or more pairs of the pinnæ again pinnate and with one or more pairs of the secondary pinnæ pinnate.

Umbel, an inflorescence in which the branches all radiate from the top of the peduncle. If these branches each terminate in a flower th umbel is simple, if they are again umbellately branched, the umbel is compound.

Valvate, said of sepals, etc., when they are only connate in bud by their edges which do not overlap.

Villose, villous, covered with long fine soft hairs.

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